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THIRTY-SECOND ANNUAL REPORT

OF THE

SECRETARY

OF THE

STATE BOARD OF HEALTH

OF THE

STATE OF MICHIGAN

FOR THE

FISCAL YEAR ENDING JUNE 30, 1904.



BY AUTHORITY

LANSING, MICH.  
WYNKOOP HALLENBECK CRAWFORD CO., STATE PRINTERS  
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OFFICE OF THE  
SECRETARY OF THE STATE BOARD OF HEALTH, }  
LANSING, MICHIGAN, DECEMBER, 1904.

To HON. A. T. BLISS, *Governor of Michigan:*

SIR:—In compliance with the laws of this State, I present to you the accompanying report for the fiscal year ending June 30, 1904.

Very respectfully,

HENRY B. BAKER,

Secretary of the State Board of Health.

92705



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# REPORT.

## PART I.

### INTRODUCTION AND GENERAL STATEMENTS.

This is the Thirty-second Annual Report of the Secretary of the State Board of Health, and is for the fiscal year ending June 30, 1904. It is arranged in two parts.

The first part contains the secretary's report of work of the Board during the fiscal year; regular and special meetings; public health legislation in 1903; president's annual address; general work in the office of the secretary; report of the secretary relative to property; financial statement; abstracts from the quarterly reports of work in the office of the secretary, and of the condition of health during the six months ending June 30, 1904. (The subject of the sickness in the calendar year preceding, is included in the article in the second part of this annual report, therefore the brief article in this first part, relating to the first six months of 1904, brings the subject completely up to date.)

The second part contains abstracts and reports, including a report on "Principal meteorological conditions in Michigan in 1903;" one on "Time of greatest prevalence of each disease," being a "Study of the causes of sickness in Michigan," especially in 1903; one on "Communicable diseases in Michigan in 1903;" and others on pneumonia, consumption, meningitis, typhoid fever, diphtheria, whooping-cough, scarlet fever, r  theln, measles, smallpox, and other communicable diseases, including chicken-pox, erysipelas, tetanus (lock-jaw), mumps (parotitis), itch, rabies (hydrophobia), glanders (farcy), actinomycosis (lump-jaw), pleuro-pneumonia among cattle and alleged nuisances.

*Reports, etc., required by law.*—Much of the work of the State Board of Health, and of its secretary and executive officer, is in the collection, preparation, and spreading of information useful for the restriction and prevention of diseases, and the methods of work are dealt with further on in this report; but, under the law, the secretary of the Board is specifically required to disseminate information "through an annual report, and otherwise;" pursuant to which, by direction of the Board, he issues immediately after the close of each week, a bulletin, which shows the diseases which caused most sickness during the week just passed; also a monthly bulletin, showing the relative importance of diseases during the month.

Since April, 1898, a monthly publication, entitled 'Teachers' Sanitary Bulletin,' has been issued by the Board to supply to more than twenty thou-

sand teachers in the public schools in Michigan suggestions to enable them better and more completely to comply with the law which requires "That there shall be taught in every year in every public school in Michigan the principal modes by which each of the dangerous communicable diseases is spread and the best methods for the restriction and prevention of each such disease."

*Sanitary information published ephemeraly.*—The secretary also disseminates information by means of the telegraph, the telephone, by letter, and especially by means of neostyled statements prepared and distributed to members of the Board, to others interested in public health work, and to newspapers in Michigan. Thus items of sanitary interest which are considered as useful "news" are published at once in comparatively ephemeral bulletins, etc., while the annual report is issued as a permanent official record of the work of the State Board of Health, of the office of the secretary, and of local boards of health throughout the State.

*Names and addresses of members of the Board.*—The names and postoffice addresses of members of the State Board of Health, and the dates of the expiration of their terms of office, are as follows:

Hon. Frank Wells, *President of the Board*, Lansing, January 31, 1909.  
 Charles M. Ranger, A. B., Battle Creek, January 31, 1909.  
 Hon. Henry A. Haigh, Detroit, January 31, 1907.  
 Victor C. Vaughn, M. D., Ann Arbor, January 31, 1907.  
 Collins H. Johnston, M. D., Grand Rapids, January 31, 1905.  
 D. A. MacLachlan, M. D., Detroit, January 31, 1905.  
 Henry B. Baker, M. D., *Secretary of the Board*, Lansing.

The members of the State Board of Health, with the exception of the secretary, are appointed for the term of six years, and receive no salary or per diem compensation for their services.

## WORK OF THE STATE BOARD OF HEALTH DURING THE FISCAL YEAR ENDING JUNE 30, 1904.

Aside from the work in committees and in connection with the office of the Secretary of the Board, the work of the State Board of Health itself has included that done at the sanitary conventions, that in connection with the examination of plans and specifications for proposed public buildings, the examination of persons to determine their qualifications for licenses to properly embalm and disinfect bodies dead of infectious and contagious diseases, and the work done at regular and special meetings of the Board.

*Conference of health officials.*—The Seventh General Conference of Health Officials in Michigan was held in Ann Arbor, January 7 and 8, 1904. The subjects to which particular attention was given were: "The Restriction of Diphtheria," "How to Make Out Certificates of Causes of Death," "Can the Present Law for the Payment of Expenses for Indigent Persons, Sick with Dangerous Communicable Diseases, be Made More Satisfactory?" "The Relation Between Human and Bovine Tuberculosis," "Disease Producing Organisms and Toxins Found in the Flesh of Animals Used as Food," "The Argument for Local Meat Inspection," "Some Lessons to be Learned from Studying European Meat Inspection," "The Sanitation of Michigan Summer Resorts," "The Causation and Restriction of Typhoid Fever," "Some Results of



Efforts for the Restriction of Tuberculosis," "The Pasteur Treatment for Hydrophobia," and "The Artificial Cultivation of Trypanosomes."

The discussions were valuable and interesting to any person who places an adequate estimate upon the value of human life, and especially to those in whose care public health interests are intrusted, i. e., the health officers. Papers were read and discussed by persons best fitted to offer suggestions upon the various topics assigned to them. Bacteriologists, practical sanitarians, statisticians, active medical practitioners and business men all combined to make this conference one of importance and value.

The conference was attended by many of the most efficient and conscientious local health officers and municipal bacteriologists, by the members of the State Board of Health, and by such of the general public as chose to attend. The proceedings of this conference were published as Reprint No. 608.

*Examination of plans for State buildings, relative to sewerage, ventilation and heating, during the fiscal year ending June 30, 1904.*—The following is a list of the buildings for which plans and specifications were examined by the Board in accordance with Sec. 2229, Compiled Laws of 1897, during the fiscal year 1904.

Special meeting at Grand Rapids, July 17, 1903.—Plans for proposed new system of underground tunnels, from the power plant to the several public buildings, at the Michigan Agricultural College. Proposed new addition, for dining rooms, chapel, etc., to the Michigan School for the Blind, Lansing. Proposed new custodial building, an auditorium building, a laundry building, additions to the hospital building, and a tool and chicken house, for the Michigan Home for Feeble Minded and Epileptic, Lapeer. Proposed new cottage, "F," an amusement hall, and a laundry building, for the Upper Peninsula Hospital for Insane. Proposed new hospital building for men, and a proposed addition to the boiler house, at the Michigan Asylum for Insane, Kalamazoo. With certain exceptions the plans for the above-mentioned buildings were approved, in so far as this Board is required by law to examine and express an opinion.

Special meeting at Lansing, September 17, 1903.—Plans for proposed Michigan Building at the Louisiana Purchase Exposition, at St. Louis, Missouri. Plans approved.

Special meeting at Lansing, February 4, 1904.—Plans for proposed Michigan State Employment Institution for the Blind, at Saginaw. Plans not approved.

Special meeting at Lansing, March 2, 1904.—Plans for proposed new power plant, and proposed new coal shed, at the Michigan State Agricultural College. Plans approved.

Special meeting at Ann Arbor, March 31, 1904.—Plans for proposed new Western State Normal School, at Kalamazoo. Proposed one story addition to the Michigan State Normal School, at Marquette. With certain exceptions the plans for the above-mentioned buildings were approved.

*Examination and licensing of embalmers.*—Under the provisions of Act No. 132, Laws of 1903, four examinations were held during the fiscal year 1904, as follows: At Grand Rapids, July 17, 1903; at Calumet, August 7, 1903; at Lansing, September 17, 1903; and at Ann Arbor, January 6, 1904. Of the 284 persons examined, 216 were granted licenses and awarded engrossed diplomas.

The following were printed in connection with the licensing of embalmers by the State Board of Health, during the fiscal year, 1904: 6,000 copies of the pamphlet, "Embalming, and the Burial, Removal and Transportation of In-

fectcd Persons and Corpses;" 2,000 copies "Applications for examination for embalmer's license;" 2,000 circulars announcing date and place of examination of embalmers; 1,000 blanks for application for renewal of license; and 1,000 vest pocket renewal cards.

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH (UNDER SECTION 7 OF ACT 132, LAWS OF 1893), EMBALMER'S FUND, AS ALLOWED DURING THE FISCAL YEAR, 1904.

RECEIPTS.	DISBURSMENTS.
Fees from applicants for license and for renewals of licenses..... \$1,452 60	Expenses of members:—
	Attending meetings..... \$142 24
	Other official..... 3 55
	Engraving, drawing, etc..... 293 64
	Instruments and books..... 34 50
	Paper, Stationery, etc..... 43 65
	Postage..... 316 96
	Printing and binding..... 141 06
	Compensation of clerks..... 418 46
	Expressage..... 3 11
	Telegrams..... 3 65
	Telephone..... 5 40
	Fees returned to applicants..... 10 00
	Miscellaneous..... 33 53
	Unexpended balance, turned over to State Treasurer..... 2 85
Total receipts..... \$1,452 60	Total disbursements..... \$1,452 60

REGULAR AND SPECIAL MEETINGS OF THE STATE BOARD OF HEALTH, DURING THE FISCAL YEAR ENDING JUNE 30, 1904.

The minutes of the regular and special meetings of the Board up to and including the meeting October 23, 1888, were copied into the permanent record books in the office of the secretary. From that time to and including the proceedings of the meeting May 13, 1898, the minutes were printed in the annual reports of the Board. Commencing with the annual report for 1899, in accordance with the law of 1899, the volume was greatly reduced in size, being limited to 300 pages. Accordingly mention only may be made of the times and places of meetings and members present at each of the regular and special meetings during the fiscal year, but a complete record of the meetings is kept in the office of the secretary.

*Regular meeting, July 8, 1904.*—The members present were: Hon. Frank Wells, president; Victor C. Vaughan, M. D., Hon. Henry A. Haigh, Charles M. Ranger, D. A. MacLachlan, M. D., and Henry B. Baker, M. D., secretary.

*Regular meeting, October 14, 1904.*—The members present were: Hon. Frank Wells, president; Hon. Henry A. Haigh, Charles M. Ranger, and Henry B. Baker, M. D., secretary.

*Special meeting, November 16, 1904.*—The members present were: Hon. Frank Wells, president; Hon. Henry A. Haigh, Charles M. Ranger, and Henry B. Baker, M. D., secretary.

*Regular meeting, January 20, 1905.*—The members present were: Victor C. Vaughan, M. D., Hon. Henry A. Haigh, D. A. MacLachlan, M. D., Collins H. Johnston, M. D., and Henry B. Baker, M. D., secretary.



*Special meeting, March 16, 1905.*—The members present were: Victor C. Vaughan, M. D., president; Hon. Henry A. Haigh, Charles M. Ranger, Malcolm C. Sinclair, M. D., Angus McLain, M. D., Hon. Coleman C. Vaughan, and Henry B. Baker, M. D., secretary.

*Special meeting, April 5, 1905.*—The members present were: Hon. Henry A. Haigh, Malcolm C. Sinclair, M. D., Angus McLean, M. D., Hon. Coleman C. Vaughan, and Frank W. Shumway, M. D., secretary.

*Regular meeting, April 14, 1905.*—The members present were: Victor C. Vaughan, M. D., president; Hon. Henry A. Haigh, Charles M. Ranger, Malcolm C. Sinclair, M. D., Hon. Coleman C. Vaughan, Angus McLean, M. D., and Frank W. Shumway, M. D., secretary.

*Special meeting, Ann Arbor, June 2, 1905.*—The members present were: Victor C. Vaughan, M. D., president; Angus McLean, M. D., Malcolm C. Sinclair, M. D., Charles M. Ranger, and Frank W. Shumway, M. D., secretary.

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## PUBLIC HEALTH WORK IN MICHIGAN.

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### ANNUAL ADDRESS OF THE PRESIDENT OF THE STATE BOARD OF HEALTH.\*

BY HON. FRANK WELLS, PRESIDENT.

Being absent from the State at the time of the regular meeting of this Board in April, and therefore unable to present the annual address of the president, provided for by our rules, I will ask you to consider now what I might have said then had I been here to say it.

Before considering subjects connected with the work of our Board within the State, I will take the liberty of presenting as briefly as possible some of the matters related directly or indirectly to public health work, which came under my observation during a visit of several months in some of our western states, especially in California. Most of my time was spent in Pasadena, the little city of Southern California which has acquired a world-wide reputation for its beauty and for its mild and equable climate.

Southern California, the earliest portion of this country recommended for consumptives, is still a favorite resort for those afflicted with this disease, though Colorado, Utah and New Mexico have probably been, during recent years, more preferred by this class. Quite naturally in none of these states is there any special welcome extended to these unfortunates. Neither municipalities nor states make any provision by means of hospitals or sanatoria for their comfort or treatment. Nor has individual effort done much in this direction. A sanatorium for consumptives a few miles from Pasadena, beautifully located at the foot of the Sierra Madre mountains, at an altitude of 1,800 feet, is a private enterprise. I visited it a year ago, a few months after it was open for patients, and again this year. Dr. F. C. Melton, its manager, has had, I believe, some experience in a sanatorium of a similar kind in Germany. The grounds consist of one hundred and sixty acres of land descending to the south

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\*July 8, 1904.

and thoroughly protected from northerly exposures by high mountains. Shingle roofed cottages, into which the air has free access, with facilities for heating by stoves, accommodate most of the patients, though some are lodged in the main building. Fruits and vegetables are raised upon the grounds, which also embrace a dairy and chicken ranch. A laboratory, with X-ray machine and other scientific appliances, form an addition to its other equipment and advantages which make this sanatorium seem quite ideal. The observance of well established rules in the disposition of sputa, with good food, good air, and proper exercise, constitutes the treatment, drugs being resorted to only in advanced cases, or where complications are present. It is claimed that all cases in the early stages of the disease are benefited, and a very large proportion probably cured. The period, a little over a year, during which *Esperanza* (the name of this sanatorium) has been in existence is too brief to show whether permanent cures have been effected or not. Quite a number of deaths of patients received during advanced stages of the disease have occurred. A desire on the part of the owners of a private institution of this kind to make their investment profitable, is a powerful inducement to take incurable cases off the hands of physicians and from proprietors of hotels, cottages, boarding and tenement houses, for the large pay that is sometimes offered. The influence which results from such action upon the minds of patients in the curable stages of the disease must be depressing, and probably lessens their chance for recovery. In this and in other ways the desire to make private institutions of this kind self-sustaining or profitable is manifested quite generally, at least throughout the west. At Denver a private and largely patronized sanatorium for consumptives does not have the confidence of the medical fraternity of that city for the reason, as is claimed, that it is conducted upon plans which seem most profitable to its owners and not primarily to heal the sick.

To the city of Denver still go many consumptives. A large proportion of them, as I was informed by Dr. C. F. Cooper, Secretary of the State Board of Health of Colorado, arrive there friendless, alone, and with little money. They are refused admittance to hotels, boarding houses and rented rooms by proprietors who are keenly alive to the losses they may suffer through contamination of premises due to the presence of these unfortunates. Most of these consumptives find but one place open to them. This is the hospital, connected with the county buildings. Here, if they go, each one is herded with scores of other victims in various stages of the disease, all treated alike, furnished with common fare, without any of the comforts which most of them have been accustomed to, little or no care taken of sputa, without medical attention until too ill to have it avail, lonesome and homesick, death, the only alternative, soon brings to them a welcome relief from their misery and despair. A question one naturally asks upon first learning these facts is why does not the State of Colorado, and the other western states into whose borders so many consumptives rush, under the mistaken belief that there is something peculiar in their climate which is sure to heal them, provide, in the interest of humanity, hospitals where these unfortunates may be taken care of properly and shown how they may best prolong their lives and, if possible, be cured? In hospitality, liberality and unselfishness, the people of our Western States are the peers, if not the superiors, of the people of the Eastern and Middle States, but in none of the States where consumptives congregate has any such step been taken. Perhaps they are but waiting for someone to awaken them to a consciousness of their duty. If this is so it should not be done by a citizen of Michigan. To ask a State to make such provision for citizens



of other States would illy become an inhabitant of a state which refuses to make similar provision for its own citizens. The impossibility of more than a very small proportion of consumptives who go west in search of health finding the comforts they require and the instruction they need, with the homesickness due to the absence of members of their families or friends, renders the sending of such victims across the continent unjustifiable and emphasizes the necessity of State sanatoria for this class within the borders of the States where they reside.

While in Pasadena I visited the sewage farm belonging to that city. This farm has become somewhat noted for the reason that it not only disposes of the sewage of Pasadena satisfactorily; but it is a source of revenue to the city. The farm is about a mile long and a half mile wide. Its locality and topography are such as to permit of the distribution of the sewage to every portion of its surface by means of basins with gates to govern the direction of the effluent, and connecting shallow ditches similar to the ditches used for ordinary irrigation. The sewage is conducted to the farm through ordinary sewer pipe by gravity alone, thus making the entire system extremely simple and inexpensive. Experiments during a number of years in raising crops of various kinds and of stock has demonstrated that at the present time walnuts seem to promise the best profit. From a large grove of walnut trees already bearing, an income was derived last year of \$8,000. The odor from the sewage, as it flows over the land, is not offensive, and one finds it after a short period scarcely noticeable. It causes no sickness or discomfort to the superintendent and the few laborers employed upon the farm. While the occupants of some of the neighboring ranches are said to be mildly prejudiced against the farm, no one claims to have suffered any ill effects due to its proximity. Though the financial success of this undertaking is largely due to climatic conditions, yet one cannot fail to be impressed with the belief that the time is not far distant when in regions where frost prevails during a large part of the year, inexpensive methods will be discovered to render, in some such way as this, the sewage of cities not only innocuous but, perhaps, even profitable.

During a few days spent in San Francisco I had an opportunity to inspect the work being done in Chinatown under the direction of Passed Assistant Surgeon Rupert Blue, intended to free that locality from pest infection and to generally improve its sanitary condition. I was taken by Surgeon Blue to a meeting of the city board of health where, as is usual at the present time at its meetings, orders for the partial destruction of buildings were made. Such orders were being enforced during the time I spent in Chinatown. Fires in the streets were consuming floors and other portions of buildings which were being torn out, and the debris and walls inside these buildings were being drenched with disinfectants. The principal object sought is to render buildings, as far as possible, rat proof, in order to prevent the spread of bubonic plague by means of these rodents, or by a certain flea with which they are infected, which seems to be the bearer of at least one form of the disease. To accomplish this object all wood floors in basements, or wherever such floors come in contact with the ground in buildings, are removed and burned. Proprietors, in replacing these floors, are required to use concrete, thereby rendering basements rat proof. Adequate and proper plumbing is now being required in all buildings. This is a long needed and very important reform, and must greatly improve the sanitary condition of this quarter.

I also attended a joint meeting of the president and secretary of the State Board of Health, with the president and secretary of the municipal board,



together with Surgeon Blue representing the United States Public Health Service. Perfect harmony prevailed at this meeting and the best means for continuing the renovation of Chinatown were discussed. This discussion showed a thorough appreciation by all these representatives of the measures necessary to place this portion of the city in a condition in which it will no longer be a menace to its immediate surroundings, as well as to the country at large, and a determination to enforce such measures as rapidly as possible. In subsequent conversations with President Regensburger and Secretary Foster of the State Board, and with President Ward and other members of the local board and its health officer, I was informed by all these gentlemen that no effort would be spared to accomplish this object. During a drive about the city, tendered me by Mayor Schmitz, of San Francisco, I was pleased to hear from his own lips how important this executive regards the sanitary condition of the city. This regard has already been shown by the mayor through the prompt exercise of his authority in the support of all sanitary measures for the renovation of Chinatown and for the city generally. It was especially shown in the appointment of the members of the new municipal board of health, all of whom are young men, intelligent and thoroughly impressed with the importance of the work they were chosen to perform. From my observations, therefore, I am quite convinced that so long at least as the sanitary affairs of San Francisco are in the hands of the present authorities of both State and city, any danger which may have existed at one time of the spread of bubonic plague from that city has practically disappeared.

#### CONFERENCE OF MICHIGAN HEALTH OFFICIALS.

But one public meeting has been held under the auspices of this board during the last twelve months. This one was the Conference of Health Officials held at Ann Arbor, January 7 and 8 of this year. Many excellent papers were read at this Conference, and the comparatively few health officials present expressed very great satisfaction with them and with the discussions. It was voted to hold another Conference next year, and May was selected as the month which promised the largest attendance.

It is to be hoped that sometime people will begin to recognize the superior importance of public health work, and select officials who will be sufficiently alive to its value to see that health boards are composed of men who will not select a health officer merely because he will promise to perform the duties of the office for a pittance, but that zeal and ability shall be the first requisites in such selection. Such an officer should receive ample compensation for, and every possible aid in, the prosecution of his duties. When this time comes the value of conferences of health officers will be recognized by the people and felt by the officials themselves. Hundreds will attend these meetings where scores do at the present time, and their influence in the promotion of the health service of the State will be very great.

#### VITAL STATISTICS.

As reported to the Vital Statistics Division of the Secretary of State's office, deaths from all causes during 1903 were a trifle greater in number than during 1902, the rate for 1,000 population being 13.2 for 1903, as compared with 12.6 for 1902, being the same rate as for 1901.

Of these deaths those due to tuberculosis were greater by 129 during 1903 than during 1902, the numbers being 2,352 and 2,482 for the two years respectively.

Deaths from pneumonia were 64 less during 1903 than 1902, the numbers being 2,907 and 2,843 respectively, for these two years.

Cancer showed its customary increase of deaths, the number being 1,441 in 1902 and 1,659 in 1903, an increase of 218, or about 15 per cent.

Diarrheal diseases of infants under two years showed an increase of deaths from 1,350 in 1902 to 1,652 in 1903, a very marked increase of 302, or over 20 per cent.

Typhoid fever showed about the same mortality for the two years, deaths reported from this disease being 592 in 1902 and 594 in 1903, a difference of only two.

It is difficult to account for the increase in the number of deaths from tuberculosis during 1903 over those of 1902, unless it be due to an increased number of questionable cases reported as tuberculosis. Both the summers of 1902 and 1903 were cold and wet and, therefore, quite unfavorable for those suffering from tuberculosis. The effect of such climatic conditions is strikingly shown in the large increase of deaths from both tuberculosis and pneumonia during the first five months of the present year, as compared with the same months of the preceding year. Deaths from tuberculosis during these months were 1,104 in 1903, and 1,207 in 1904, an increase of 103, or nearly ten per cent. Deaths from pneumonia were 1,720 in 1903 and 1,856 in 1904, an increase of 136, nearly eight per cent for the five months of 1904. The unusually cold winters and the unusually cold and wet summers of the last two years have been in some degree responsible, I believe, for the increased number of deaths from both these diseases during that period. Perhaps the prevalence of smallpox may have been a factor, because, from certain facts which further on in this address I wish to present for your consideration, it is evident that that disease has largely displaced the other communicable diseases in the time, attention, and money devoted to attempts for its restriction.

#### VENEREAL DISEASES.

An unusual degree of interest in venereal diseases has been awakened in the minds of physicians and sanitarians during the last two or three years. Though their importance as causes of sickness and death have always been recognized as very great, yet it is only during a quite recent period that much serious consideration has been given to their influence upon public health, or much thought bestowed upon the possibility of their restriction. The nature of these diseases is such as to largely preclude the publicity common to most other kinds of sickness. For this reason comparatively little trustworthy knowledge concerning their prevalence has been available. No attempt has been made by any State in our country to obtain statistics concerning them, and it was but little over a year ago that the Conference of State and Provincial Boards of Health, after a strong opposition from several of its members, decided to place them in its list of diseases dangerous to the public health. Probably the first systematic attempt made in any State to obtain information concerning the prevalence of these diseases has quite recently been made by Dr. Baker in adding, as instructed by this Board, the names of these diseases to the list which is furnished to observers who report the sickness statistics of Michigan to this office. The result of this action has been surprising, for one of these diseases, gonorrhea, has promptly taken its position as sixth in importance in a list of twenty-nine, thereby demonstrating its prevalence, so far as these reports show, as more extensive than consumption, pneumonia, typhoid fever, cancer, and the common diseases of childhood. The other

disease, syphilis, is tenth on the list, leading, at the present time, typhoid fever, pneumonia, and cancer.

Positive knowledge concerning the prevalence of venereal diseases in Europe seems also to be quite limited. The only attempt to secure such knowledge seems to have been made by the Prussian Government, which requested all physicians to report every case each one had under treatment at a fixed date, April 30, 1900. The evidence from these reports placed the number of sufferers in that single country at three-fourths of a million.

It is undoubtedly due to the fact that official records of these diseases have no existence that so much apathy has been manifested concerning them. Trustworthy information regarding their seriousness and prevalence is now reaching us from many quarters, and it is quite startling. For example, it was stated by Dr. Henry D. Holton of Vermont, in a paper read by him at the Conference of State and Provincial Boards of Health, held at Baltimore last October, quoting from the report of the committee on prophylaxis of venereal diseases, of which he was chairman, made to the American Medical Association May, 1903, "that eighty per cent of all deaths from pelvic diseases in women were due to gonorrhea. Twenty per cent of all blindness is due to gonorrheal infection of the new born. Fifty per cent of all involuntary childless marriages are caused by gonorrhea, of which forty-five per cent are due to marital infection by men." Dr. Holton further states in this paper "that venereal diseases stand next to tuberculosis and alcoholism, if not superseding them. They are permeating the very root of the population as 15 to 20 per cent of adult males are infected with syphilis, and about 80 per cent of them had gonorrhea." The facts cited by Dr. Holton from this report were none of them questioned by the members of the Conference who discussed the paper, and the opinion expressed by nearly all was that physicians, boards of health and sanitarians generally should make some effort to endeavor to check the spread of the two diseases which were admittedly creating such widespread havoc. It may seem to many that those who have become the victims of these diseases through their own immoral acts are suffering only a just penalty for their folly; yet in too many instances the penalty falls upon their innocent wives and families with far greater force than upon the transgressors themselves.

At the recent meeting of the American Medical Association at Atlantic City. Dr. Holton, as chairman of this same committee, which had been continued, made a further extended report upon the prevalence of venereal diseases and the efforts made to restrict them in our own and other countries. This report presents still further evidence concerning their seriousness, with lamentable failures upon the part of governments to restrict them. Out of thirty-three States of the Union replying to questions propounded by the committee asking for information concerning any legislation had in either of these States upon this subject, the answers were negative from all but one. It is, perhaps, needless to state that that one was Michigan. In this State the committee found a statute approved June 15, 1899, punishing by a fine of not less than \$500 nor more than \$1,000 any person who has had syphilis or gonorrhea, and has not been cured of the same, who shall marry. In prosecutions under this act husbands or wives may testify against each other without the consent of the opposite party.

Dr. Ludwig Weiss, of New York, who was secretary of this committee, has published an admirable paper with the title, "Venereal Prophylaxis that is Feasible." In it he urges individual prophylaxis. He claims that this is due to the thousands who each year will otherwise become the innocent victims of this disease. To him these count of far more importance than the possible in-



crease of vice which a knowledge of how infection may be prevented might produce. The whole subject is one which is, and will doubtless continue to be, viewed from two aspects, the moral and the physical. Without in any degree depreciating the moral view, it seems to me that this Board should consider the subject, if it considers it at all, from a sanitary standpoint exclusively. If it believes these diseases are as serious, and their prevalence as extensive as the literature from which I have quoted and much more which I have not time to present, seems to indicate, the duty of taking some steps looking to their restriction would seem to be quite imperative. As a foundation for some action on the part of this Board, I recommend:

*First*, That syphilis and gonorrhea be placed by this Board in the list of diseases regarded by it as dangerous to the public health, to be reported by physicians and householders to local health officers.

*Second*, That health officers in reporting these diseases to this Board refrain from giving the names of those sick with them, or from taking any other action except such as may be required by their local boards.

*Third*, That a leaflet or leaflets be prepared and issued by this Board, showing the various ways by which syphilis and gonorrhea may be contracted, how serious both these diseases are, especially in their ultimate effects, and that it is the innocent who are the greatest sufferers. Also explicit directions of how the disease may be prevented from spreading, together with such recommendations concerning prophylaxis as may be considered efficient, if any such exist.

#### EXPENSES DUE TO DANGEROUS COMMUNICABLE DISEASES AMONG THE INDIGENT.

Dr. Baker has recently set on foot an investigation, the object of which is to show the amounts expended by municipalities in caring for persons infected with dangerous communicable diseases, who were unable to pay such expenses themselves, and the proportion of these expenses which were allowed by boards of supervisors to reimburse the municipalities making the expenditure, under a law which was amended at the last session of the legislature making provision for this purpose. The work has involved a large amount of correspondence and is still incomplete, owing to delays upon the part of officials in replying to letters and in furnishing the information sought. The knowledge already obtained is of much interest in itself, and furnishes, I believe, a very fair foundation for estimates which further developments are not likely to greatly modify.

Information was asked concerning amounts expended by municipalities for the items specifically of medical attendance, medicines, food and clothing, nurses, guards, funerals, vaccination, antitoxin, disinfectants, household goods destroyed, and fees or salary of health officer, for each of the diseases, diphtheria, scarlet fever, typhoid fever, measles, whooping-cough, consumption, meningitis, smallpox and pneumonia. The amounts reimbursed to the municipalities by the counties for each of these diseases and for each purpose named, was also asked. Reports from sixty-six of the eighty-three counties of the State have been received and compiled. These sixty-six counties represent a population of 1,655,322, estimated population of 1903, while the seventeen counties from which reports have either not yet been received, or only partially received, and which include the counties of Bay, Kent and Wayne, represent an estimated population in 1903 of 855,330.

Local acts exempt the counties of Huron, Lapeer, St. Clair, and since May 14, 1903, Mason, from the law which makes all the other counties of the State finally responsible for the expenses of the indigent sufferers from communi-

cable diseases. In these exempted counties the expenses are borne by the municipalities without reimbursement by the counties.

I shall, at the present time, consider a few only of the most striking facts which these reports reveal, leaving the more thorough consideration of all the information they contain to be digested when the report shall be more complete.

The amount expended by the municipalities of the sixty-six counties which have reported was \$142,312.24 for all the diseases and for the various purposes, and the proportion of this expenditure allowed by the boards of supervisors of the counties was \$124,649.31, about 80 per cent. Estimating the remainder of the State upon the basis of population with the same ratio of expense that prevails in the sixty-six counties reporting, and we find the amount expended in all the cities, towns, and villages in the State for indigent persons sick with dangerous communicable diseases to have been \$215,847.05 during the year 1903. Some of the diseases for which this sum was expended estimated in the same way are:

Diphtheria.....	13,699
Scarlet fever.....	14,838
Typhoid fever.....	11,236
Measles.....	851
Consumption.....	149
Pneumonia.....	00
Smallpox.....	117,446

The most striking fact shown by this report is the extremely large proportion of this expenditure of public money used for smallpox, and the extremely small proportion used for the diseases which cause most deaths. Of the entire estimated expenditure of \$215,847.05, more than one-half, \$117,446, was for a disease which at the present time is not only insignificant as a cause of death, only twenty-nine deaths having resulted from it during the year, but is, besides, absolutely preventable through vaccination. In view of this fact, most of the expense thus incurred for domestic quarantine and other measures for the restriction of smallpox, was unnecessary. The control of smallpox becomes simple when health authorities act solely upon the well established fact that the recently successfully vaccinated do not have the disease. As has been shown, three preventable diseases, tuberculosis, pneumonia and diarrheal diseases of infants caused 6,977 deaths in Michigan in 1903. If even the amount used for smallpox had been applied intelligently for the restriction of either or all of these diseases, lives, probably in considerable numbers, would have been saved. I am glad the people of Michigan were taxed nearly a quarter of a million dollars last year for the indigent sufferers from communicable diseases, but regret that so large a portion of it was misapplied. I shall be glad to have the amount doubled this year, *provided the money is used where it is most needed.*

It is the almost universal testimony of health officers that they are debarred from carrying out preventive measures for lack of funds. City councils and village boards will not, as a general rule, appropriate money for public health work until a disease regarded by them as contagious has actually made its appearance. In every municipality there should be a public health fund to be drawn upon, under proper restrictions, by the health board whenever and however the public interests demand. Bills have been before several legislatures providing for such a fund to be created by the voters of every city, village or township in a similar manner to that in which funds are provided for



school purposes. A law based upon this theory, or some other which would provide a public health fund in every municipality, is greatly needed.

The law rightfully places in the hands of local health boards and local health officers authority to take all the active measures necessary to restrict the spread of the communicable diseases. Within certain limits the rise and fall of these diseases in the State is a measure of the intelligence and efficiency of such officials. Among these limits climatic and other natural conditions beyond their control must always have more or less influence. But money is the most important element to their success, and its absence an almost certain cause for failure.

Knowledge concerning diseases, their causes, and how they may be restricted, increases daily, and this Board is, I believe, conscientiously striving to disseminate this knowledge among the people of the State. But in too many localities these efforts are not seconded by those whose duty it is to do the active work which is absolutely necessary to success in combating the ceaseless enemies of health and life.

#### LOCAL LEGISLATION OF 1903, RELATIVE TO CONTAGIOUS DISEASES, IN THE COUNTIES OF SAGINAW, GOGEBIC, BARAGA, IRON, MARQUETTE AND BAY, AND ACTION BY BOARDS OF SUPERVISORS THEREON.

During the Legislative Session of 1903, two local acts of great importance were passed and approved, pertaining to the medical care and maintenance of indigent cases of contagious diseases in the counties of Saginaw, Gogebic, Marquette, Iron, Baraga, and Bay.

##### SAGINAW COUNTY.

Local Act No. 445, Laws of 1903, provides for the biennial election by popular vote of a county poor physician for the county of Saginaw, fixes his compensation, prescribes his duties, and regulates the liability of the county for the care of indigent persons affected with contagious diseases. Section 1 provides for his election and qualifications. Section 2 provides that he shall take the oath of office, deliver a bond in the penal sum of \$2,000, and provides a salary of \$1,200 per annum and actual and necessary traveling expenses. Section 3 is as follows:

"Sec. 3. Said county poor physician shall have a general supervision over all cases of contagious diseases where the person or persons so afflicted shall become a county charge, as hereinafter set forth, to-wit: All cases of smallpox, diphtheria, scarlet fever, typhoid fever and measles, where the person so afflicted shall be quarantined by the attending physician, or any local board of health; but, before the county shall become primarily liable for the care and maintenance of any such person or persons, they shall, by themselves, their father, mother, guardian or other person legally liable for their support, make and subscribe an affidavit setting forth that he or they are not the owner or owners of property in excess of the cash value of one thousand dollars, and that they have no other means of support than that of their daily labor; all such affidavits shall be immediately forwarded to the office of the county poor physician."

Section 4 provides that upon receipt of such affidavits, the county poor

physician shall "immediately proceed to supervise the care and maintenance of such poor person or persons, by contracting with any reputable physician in the county for medical attendance, which shall include medicines for the patient, in reasonable amounts, and shall provide a nurse, or nurses, if deemed necessary, and contract with the lowest responsible bidder for the necessary clothing, provisions and fuel for the proper care of any such patient." Provided, That where the patient is put in a pest house with other patients the county shall be liable for its pro rata share.

Section 5 provides that the county shall not be liable in any other manner than as set forth in section four, and that all bills are subject to the final auditing of the board of supervisors, though they must be endorsed by the county poor physician.

Section 6 provides a penalty for making a false affidavit.

Section 7 provides a penalty for the collusion of the county poor physician with any person or persons to defraud the county.

Section 8 provides that the prosecuting attorney shall investigate apparent frauds, and enter suit against the county poor physician and his bondsmen.

Section 9 repeals all acts inconsistent with or repugnant to the provisions of the act.

#### GOGEBIC, MARQUETTE, IRON, BARAGA AND BAY COUNTIES.

Local Act No. 469, Laws of 1903, authorizes the boards of supervisors of the counties of Gogebic, Marquette, Iron, Baraga and Bay to have general supervision in cases of contagious diseases arising in said counties; to audit and pay all bills contracted therefor; to establish one or more pest houses, and to employ one or more county physicians and prescribe their duties.

Section 1 confers "general supervision over all contagious diseases arising or existing in their respective counties, and in order to carry out their authority therein, may make such rules and regulations relative to the same as said boards of supervisors may deem proper; said rules and regulations to be duly entered in their records." Authority is conferred to establish one or more pest houses "for the reception and treatment of persons having any malignant and infectious disease, dangerous to the public health, and for the care of all persons who may have been exposed to any such disease." Authority is also conferred to hire all necessary officers and servants and prescribe their duties and compensation.

Section 2 provides that "Each of said boards of supervisors shall have power to contract with and appoint a county physician and prescribe his duties;" that the county physician shall file his acceptance with the county clerk, and shall hold his office "for the term of one year and no longer, unless reappointed;" that he shall receive the compensation prescribed by the board of supervisors, and legalizes the action by the Gogebic County Board in appointing a county physician.

Section 3 provides that the county physician shall, "when called upon by the supervisor of any township, president of any village, or mayor of any city within his respective county, to investigate cases of contagious, malignant diseases dangerous to the public health, to immediately visit the locality where they may exist, and take such steps for the proper treatment of the same as said county physician may deem proper, subject, nevertheless, to the general rules formulated by the board of supervisors of his respective county for his guidance therein, and no bills or accounts incurred for the treatment of said diseases shall be binding upon or payable by the said county unless the



same shall have been incurred under and by direction of the authority of the county physician thereof."

Section 4 provides that during the absence or inability of the county physician to perform his duties, the chairman of the board of supervisors may designate in writing some other physician to temporarily perform the duties.

Section 5 provides that all bills payable by the county shall be presented for allowance and payment as soon as may be after the same has been contracted, and all bills shall have endorsed thereon the certificate of the county physician.

Section 6 reads: "In order to carry out the provisions of this act, the said boards of supervisors shall be vested with all the powers vested in local boards of health under the general laws of this State, and the said county physicians, in the performance of their duties, shall possess all the authority now vested in health officers under the laws of this State."

Section 7 reads: "This act shall not be construed as doing away with the local boards of health in any of said counties, but the same shall continue to perform their duties as prescribed by law with the exception that said local boards of health shall not have the power to bind their respective counties with the payment of any accounts contracted by them in the treatment of contagious malignant diseases unless they shall act under the direction of the county physician of their county."

Correspondence with clerks of the counties of Gogebic, Marquette, Iron, Baraga, and Bay, was entered into to ascertain what action was taken by the boards of supervisors under the special act, to obtain a copy of the proceedings of the meetings at which such special action was taken, and to obtain the names and addresses of the county poor physicians. Replies were received from all the counties.

#### GOGEBIC COUNTY.

August 4, Mr. A. D. Johnston, Clerk of Gogebic County, wrote this office that Dr. Frank R. Loope of Ironwood had been employed as county physician, to "have care and supervision of all cases of smallpox or other contagious diseases dangerous to the public, and control of the expense connected with the care of the same."

#### BARAGA COUNTY.

Mr. Martin Voetsch, Clerk of Baraga County, under date of August 5, wrote this office that a contract was entered into with Dr. R. S. Buckland of Baraga at a salary of \$250 per annum, "to furnish medicine and medical attendance to all persons infected with smallpox or other sickness dangerous to the public health, for which Baraga County may be liable."

#### IRON COUNTY.

Under date of August 4, Mr. Wall, Clerk of Iron County, wrote this office that that county had taken no action to date.

#### BAY COUNTY.

August 1, Mr. C. M. Sweeney, Deputy County Clerk of Bay County, wrote this office that on May 1 and 2, 1903, the board of supervisors appointed a committee of three, with full power to divide the county into districts, solicit bids, and enter into contracts with reputable physicians for the handling of smallpox, which appears to be the only disease upon which the county of Bay



has taken action. The county was divided into four districts, and county physicians contracted with at salaries ranging from \$335 to \$1,200 per year, and aggregating \$3,185. In their contracts, the county physicians agree "to treat medically and surgically all persons afflicted with smallpox in said county of Bay in his district, and at his own cost and expense furnish all necessary medicines and vaccines and disinfectants necessary for treating and caring for such persons afflicted with smallpox, vaccinate all persons and disinfect all property belonging to such persons so afflicted, so to be vaccinated and disinfected." Mr. Sweeney also said that it was the intention of the board at the October session to adopt rules and regulations by which the smallpox physicians may be governed. He comments upon the fact that the expense of treating smallpox from May 14 to July 31 inclusive was less than \$1,800, a little over \$700 per month; while from Jan. 25, 1901, to October 29, 1902, the expense amounted to \$32,112.26, about \$1,460 per month. He also stated "that since the entering into contract with different physicians, a very noticeable decrease in the number of cases and the length of time for which they run is plainly manifest." Bay county during the time from January 1901 to October 1902, when smallpox was very prevalent, paid all smallpox bills without regard to the ability of the persons themselves to pay.

#### MARQUETTE COUNTY.

Under date of August 3, Hon. F. A. Bell, prosecuting attorney, replied to a letter from the Secretary of this Board to Mr. Ross, the County Clerk, stating that the whole subject had been referred to a committee and it was expected to close the matter shortly. In this connection it might be pertinent to state that under date of August 6, the secretary received a letter from Hon. Theodore A. Felch, M. D., Mayor of Ishpeming, stating that Marquette County wished to establish a system whereby cases of "smallpox especially" may be taken care of under a contract of some kind with local medical men, and asking that the secretary refer him to some system which he approved, and send him notes of reference, especially as to prices paid by visit or contract. Dr. Felch's letter was awaiting the secretary's return from Calumet and he replied, under date of August 14, stating the facts, as indicated above, the action taken by the counties of Gogebic, Baraga, and Bay, under the local act and stated that he was unable to refer him to a system which he could approve of, and wrote as follows:

"It is too early to predict any result of the movement inaugurated by the different boards as provided by the law, which may result in a radical departure. The matter of expense incident to the care of the indigent, sick with dangerous communicable diseases, and especially smallpox, appears to have been the cause of a loud 'kick'. The great expense to which Bay county was subjected, amounting to over \$32,000, was incurred in the care of all cases of smallpox, *whether the persons were able to pay or not.*

"Section 4424, Compiled Laws 1897, under which the great expense was incurred, was amended at the last session of the legislature. The amended section appears to vest boards of supervisors with power as to the investigation of claims against the counties for the care of indigent sick. The amended section, while open to serious objections, is an improvement over the old law, and with its provisions I do not see the necessity for any boards of supervisors taking action, as have the counties of Gogebic, Baraga, and Bay. Perhaps the engagement of one good physician, with whom local boards of health, particularly in the rural districts, could easily and personally consult upon questions as to the direction and management of local indigent persons sick with dangerous communicable diseases, would be advisable, but I do not advise any action which would take from the local boards of health and health officers the active management of dangerous communicable diseases. There is no doubt that in many rural communities in this State, personal direction in the management of dangerous communicable disease cases by some competent medical sanitarian, would do much good.

"It seems to me that if the action of your board of supervisors can be to leave the *restriction* of smallpox, and all diseases dangerous and communicable, to the local health officials, and confine the action under the new local act to providing for the *medical care* of the cases, it would promise the best results. The wording of one part of the new local act would seem to imply that as the intent of the act."

## LOCAL LEGISLATION OF 1903, RELATIVE TO THE PROVISION FOR HOSPITALS IN THE COUNTIES OF BARAGA AND IRON.

Local Act No. 274, 1903, authorizes the counties of Baraga and Iron "to construct or purchase, own and maintain one or more hospitals, pest houses or quarantine buildings, and to provide the means for constructing or purchasing, maintaining and managing the same."

Section 1 provides for the construction, maintenance and control of hospitals, quarantine buildings or pest houses; the employing of persons for the care and management thereof; the care and treatment of diseased persons therein, and the compensation to be received by such employes. The boards of supervisors or county physicians may cause the removal of persons sick from or exposed to any dangerous communicable disease to such hospital or quarantine building, and provide a punishment to prevent such persons from departing therefrom until discharged.

Section 2 provides that the boards of supervisors shall have the same powers as are conferred upon boards of health by Chapter 46 of the Compiled Laws of 1891, not inconsistent with this act, and to enact rules for the enforcement of such powers.

## GENERAL WORK IN THE OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH DURING THE FISCAL YEAR ENDING JUNE 30, 1904.

Much of the work of this office naturally groups itself under three heads,—the collection of information, the compilation and elaboration of information, and the dissemination of information. In the following outline that grouping is adhered to so far as is practicable without repetition.

### COLLECTION AND COMPILATION OF INFORMATION.

*Return of names and postoffice addresses of health officers.*—There is a local board of health in every township, and in every incorporated city and village in Michigan.

Every local board of health in Michigan is required by law to appoint and constantly have a health officer, and to report his name and address to the Secretary of the State Board of Health at Lansing.

Blanks for the return of the names and addresses of health officers are sent out by the Secretary of the State Board to the local health officers about the first day of April, the law (Sec. 4411, Compiled Laws 1897), requiring the ap-

pointment and return to be made "within thirty days after the annual township meeting in each year."

In April, 1904, the usual demand was made upon the supervisors of townships, presidents and clerks of villages, and mayors and clerks of cities, for the return of names and postoffice addresses of health officers to serve in 1904-1905. The circular and blank forms are somewhat similar to those printed on pages xiii-xiv of the report of this Board for 1884. In June 1904, a second demand was sent to localities from which no return had been made in response to the demand in April. On the outbreak of a dangerous communicable disease in a township, city or village, in which no health officer had been reported, a third and even a fourth demand for the appointment of such officer, and the return of his name has been made; therefore, the number of health officers returned increases until the close of the year for which such officers are appointed. At the close of the fiscal year ending June 30, 1904, the numbers of health officers in townships, cities and villages returned for the years 1904-1905 were as follows: Townships, 1,178; cities, 84; and villages, 305.

Through the systems of reports to the State Board of Health by its corps of correspondents, as well as by the local health officers, by the systematic searching of the local columns of country newspapers published in Michigan, and by a diligent search of the reports of deaths to the Division of Vital Statistics in the office of the Secretary of State, the Secretary of the State Board of Health often receives information of an outbreak of a communicable disease and desires to communicate at once with the local health officer; but if no health officer has been appointed in that locality, or no return of such appointment has been made, delay occurs, and before the secretary is able to establish authentic communication with the local board of health, and a health officer can be chosen, the disease may spread widely within or without the limits of a village or township, with unnecessary sickness and loss of life. It should be said, however, that there is an increasing tendency to comply with this law, and local boards now generally act promptly and cooperate cordially with the State Board of Health in its endeavors to prevent the spread of dangerous communicable diseases.

*Special reports relative to dangerous communicable diseases.*—Every health officer is supplied with blanks [L] from this office, for reporting outbreaks of diphtheria, scarlet fever, typhoid fever, smallpox, measles, etc. (dangerous communicable diseases), to the Secretary of the State Board as required by law. A special blank [S] for reporting cases of consumption, pneumonia and meningitis is also supplied local health officers.

Upon the receipt of the report of an outbreak of such disease, blanks [M] for weekly reports so long as the outbreak lasts, are sent, with a circular letter, also a number of pamphlets containing instructions for the suppression of the disease. These pamphlets are to be distributed to the neighbors of the family in which the disease is, in order to educate them to the importance of their duty under the law, and to secure their cooperation with the health officer.

The numbers of outbreaks of such diseases which were thus attended to during the calendar year, 1903, may be found in the latter part of this report.

Later a blank is sent to the health officer of each jurisdiction for a final report at the close of the outbreak, stating just what was done for the restriction of the disease, and with what result—the number of cases and deaths, households invaded, what disinfections were used, what exceptions, and other facts supplying data for guidance of future efforts.

The facts thus collected are compiled for publication in the annual report of the Secretary of the State Board of Health. In this annual report will be



found the report of the facts relative to the dangerous communicable diseases in Michigan in the year 1903.

*Annual reports by health officers for the year ending December 31, 1904.*—In January, 1904, a circular [218] was sent to the health officer of each township, city and village in the State, about 1,631 in all, transmitting a blank form [I] for use in making his annual report to this office. This circular was substantially the same as circular [65] which is printed on pages viii-ix of the report for 1884. Blank form [I] for reports of health officers is printed in former reports. With the circular [218] was also transmitted a blank for a copy of a record of diseases dangerous to the public health, similar to the blank which is printed on page 271 of the report for 1882.

Where the name of the health officer has not been returned the blanks were sent to the president of the village, the mayor of the city, or the supervisor of the township, according as the vacancy occurred in a village, city or township.

In case this failed to secure the return in accordance with the State law, the aid of the prosecuting attorney was requested. This has had the effect of securing a more complete return of reports of health officers.

*Meteorological reports.*—A list of meteorological observers for the calendar year 1903, with a statement of what registers were received from each, is printed in this report. The reports are summarized in an article in this report on "The Principal Meteorological Conditions in Michigan in 1903," commencing on page one of Part II. The data are of great value for the purpose of studying the causes of diseases. The observations made at the office of the Board at Lansing have been summarized weekly, and a copy placed on file in the office.

#### DISSEMINATION OF INFORMATION.

*Distribution of information how to restrict and prevent dangerous communicable diseases.*—Whenever information was received of the first occurrence of diphtheria, scarlet fever, typhoid fever or typho-malarial fever, measles, whooping-cough, consumption, smallpox or cerebro-spinal meningitis, copies of a document on the restriction and prevention of the disease reported were immediately sent to the health officer with a request that he distribute them where they will be most likely to be read, and it was suggested that the neighbors of those families in which the sickness occurs would be most likely to read them at such times of danger, and it was thought that after reading them they will be most likely to coöperate with the local health officer for the restriction of the disease. Thousands of pamphlets on the most dangerous communicable diseases are distributed by the State Board of Health in this manner, in localities where the disease treated of in the pamphlet is present. They are being distributed in this way all the time, because there is no time when the State is free from consumption, scarlet fever and diphtheria, these being the most important of the dangerous communicable diseases in Michigan. Copies of the documents on diphtheria, scarlet fever and smallpox, in German or in Dutch, are also sent when it is thought they can be used to advantage. Owing to frequent requests for documents in French, Polish, Swedish, and Danish Norwegian, translations of a leaflet [47] on contagious diseases have been made into each of these languages, and copies sent to local boards of health when requested.

A record is kept of reports received, and of correspondence relative to each outbreak of a dangerous communicable disease of which the office receives information. A compilation of such information relative to the most important diseases is published in this volume.

*Printing and distribution of the secretary's annual report.*—Comparatively few copies of the annual report of the secretary are published; the whole number is not so large as the number of officers and members of local boards of health in Michigan. In accordance with the provisions of Section 10, Act No. 44, Laws of 1899, only 4,000 copies of the annual report are published, 2,000 copies less than have ordinarily been published, but about the same number of copies is allowed for distribution by the Secretary of the State Board of Health (about 3,800). The reports are sent in exchange to sanitary journals, other State Boards of Health, local health officials in Michigan, city boards of health in other States, health officials in other countries, libraries, correspondents of the Board, and to persons who request copies of the report.

*Instructions to newly appointed health officers.*—As fast as the names and addresses of health officers to serve in 1904-1905 were received, a copy of the bulletin [120] detailing the duties of health officers and of local boards of health, was sent to each one who had not served during the preceding year, together with blanks "L," "S," and "M" for the prompt report of any dangerous communicable diseases, and sample copies of pamphlets on the restriction and prevention of diphtheria, scarlet fever, typhoid fever, measles, whooping-cough, meningitis, smallpox and consumption; also a slip [224] relative to consumption being a dangerous communicable disease, and a short statement relative to its restriction and prevention; a leaflet [281] on the modes of spreading and the best methods for the restriction and prevention of dangerous communicable diseases; several leaflet diagrams showing the results for recent years in the restriction of diphtheria, scarlet fever, typhoid fever, measles and consumption, and two diagrams showing a comparison between the numbers of deaths from typhoid fever in sewered and unsewered localities.

The Teachers' Sanitary Bulletin is now in its seventh volume. During the fiscal year 1904, there were printed the following number of copies: In 1903, for each of the months of July, September and October, 23,000; for August, 24,000; for November and December, 25,000. In 1904, for each of the months of January, February, March and April, 25,000, and for June, 26,500.

Aside from a large number of shorter articles, and items relating to various phases of public health work and teaching, the following articles appeared in the Bulletin:

"The Plague in California, and What to do if that Disease Should be Brought into Michigan," by F. G. Novy, M. D. (July, 1903); "The Function of the Health Officer," by Hon. Henry A. Haigh (August, 1903); "Sewerage Into the Watercourses of Michigan. What Should be Done About it?" by Victor C. Vaughan, M. D. (September, 1903); "Pulmonary Tuberculosis and the Trades," by C. P. Ambler, M. D., Asheville, N. C. (September, 1903); "The Duties of the School Teacher in the Combat of Tuberculosis as a Disease of the Masses," by S. A. Knopf, M. D., New York City (November 1903); "Hygiene of the Farm," by Harvey B. Bashore, M. D., Inspector Pennsylvania State Board of Health (December, 1903); "Things the People Should Know About Tuberculosis," by F. M. Pottenger, Ph. M., M. D., Los Angeles, California (January, 1904); "The Argument for Local Meat Inspection," by Rev. Caroline Bartlett Crane (April, 1904); "The Causation and Restriction of Typhoid Fever," by Thomas M. Koon, M. D. (May, 1904); "The Restriction of Diphtheria," by Guy L. Kiefer, M. D. (June, 1904).

This Bulletin is published to enable the teachers in the public schools of the State to better comply with the provisions of Act 146, of 1895, which requires



that facts relative to the modes of spreading, and best measures for the restriction and prevention of the dangerous communicable diseases be taught in every public school. It is sent gratuitously to all teachers whose names and addresses can be obtained. The secretary will be grateful for all information relative to the names and addresses of teachers in Michigan, or changes therein.

*Instructions to local health officers by telephone, telegraph, etc.*—There are in Michigan about 4,500 officers of local boards of health (presidents, clerks, and health officers), many of whom are newly appointed each year, and coming to the work for the first time, need to ask many questions in order to be best prepared to serve the people in their several localities. As fast as such emergencies arise such questions are replied to by telephone, telegraph, letters, or otherwise as the occasion demands. This is one of the important functions of the central office, of the secretary and executive officer of the State Board of Health.

*Diagrams of instructive experience in Michigan.*—Diagrams showing the favorable results of isolation and disinfection of diphtheria, scarlet fever, typhoid fever, smallpox, and the generally favorable results of isolation and disinfection, lives saved by public health work in Michigan, deaths from typhoid fever in sewered and unsewered localities and in cities before and after the introduction of sewerage, the relation of low water in wells and the deaths from typhoid fever, have been printed and largely distributed. The evidence relative to the effect of isolation and disinfection as a preventive of the dangerous communicable diseases, gains strength as shown by the diagrams for each succeeding year compared with periods of years. The diagrams prove that in those localities in which isolation and disinfection of diphtheria and scarlet fever were enforced, only about one-fifth as many deaths occur as in those localities where isolation and disinfection were neglected. The diagrams relative to the other diseases show a greater or less proportion of life-saving through isolation and disinfection.

*Pamphlets and other publications of the office.*—Aside from a number of diagrams and leaflets which were printed during the year but which cannot well be enumerated here for lack of space, a large number of pamphlets were printed and distributed, including principally: The fifteenth edition of "Dangerous Communicable Diseases. 'Diseases Dangerous to the Public Health.' How Restricted and Prevented;" "The Work of Health Officers and of Local Boards of Health in Michigan;" twenty-first edition of "The Prevention and the Restriction of Typhoid Fever;" fourth edition of "Vaccination and Revaccination,—the Prevention of Smallpox;" fourth edition of "Embalming, and the Burial, Removal and Transportation of Infected Persons and Corpses," and the twenty-first edition of "Restriction and Prevention of Scarlet Fever."

*Immigrants possibly exposed to dangerous communicable diseases, and destined to settle in Michigan.*—During the fiscal year 1904, notices were received from the U. S. Commissioner of Immigrants at Philadelphia, Pa., and from the Dominion Immigration officers, Canada, relative to the occurrence of dangerous communicable diseases on board steamships prior to their arrival at U. S. and Canadian ports.

These notices gave the names and destinations of immigrants on board intending to settle in Michigan; and copies of these notices, including the lists of the names of the immigrants, were made on blanks, designed in this office for this purpose, and promptly sent from this office to the health officer of the jurisdiction where the immigrants intended to settle. The purpose of such

action is to aid the health officials in preventing outbreaks of dangerous communicable diseases, and, as a matter of fact, this method of forewarning the health officials of the localities where possibly infected immigrants are destined to settle has been productive of good results, and in recent years, while these measures have been in use, very few outbreaks have been traced to immigrants.

*Publication of proceedings of meetings of the State Board of Health.*—Abstracts and brief accounts of the proceedings of meetings of the State Board are prepared, neostyled, and distributed as soon as practicable after each meeting. The distribution of these abstracts is not the same for all meetings, being to different classes of persons according to the nature of the contents, as the action of the Board or its deliberations may be appropriate. In some instances they are sent to sanitary and medical journals, in others to teachers, health officers and others, and frequently to the members of boards of control of the different State institutions.

*Secretary's quarterly reports of work in the office.*—At the close of each quarter, the secretary prepares a brief report of the work done in the office. This report is presented, and portions of it sometimes read at the next regular meeting; and, if the abstract of the proceedings of the meeting is printed, this report is printed in the same pamphlet. It has not been practicable to print the quarterly abstract of proceedings of meetings in this fiscal year.

## REPORT OF THE SECRETARY RELATIVE TO PROPERTY, ETC., FOR THE FISCAL YEAR ENDING JUNE 30, 1904.

*To the President and Members of the Michigan State Board of Health:*

GENTLEMEN—In compliance with Section 5 of Article II of the by-laws of this Board, the following report of the "Nature and amount of property belonging to the Board, which has been received, issued, expended, and destroyed since the last report, and of property remaining on hand, and also in whose care each item of property is intrusted," is respectfully submitted:

Preceding reports should enable one to learn the items of property on hand at the beginning of the fiscal year 1903. My last report is printed on pages xxiii-xxv of the Annual Report for 1903. Since the last report, instruments and articles of a similar nature have been purchased as follows:

### PHOTO-ENGRAVED PLATES PURCHASED.\*

Forty-four plates were purchased (35 photo-engraved, and nine half-tone), as follows:

Fifteen plates relating to meteorological conditions in Michigan in 1902.

Five plates relating to weekly reports of sickness in Michigan in 1902.

One plate—Deaths in Michigan, 3 years, 1898-1900.

One plate—Movements of contagium of smallpox in 1902.

One plate—Distribution of consumption reported in Michigan in 1902.

One plate—Isolation and disinfection restricted typhoid fever reported in Michigan, 13 years, 1890-1902.

One plate—Deaths in Michigan, 10 years, 1884-93.

\*In some instances out of one fund, and in other instances from another fund; some, for illustrating the annual report of the Board, were ordered paid for by the Board of State Auditors.



One plate—Isolation and disinfection restricted diphtheria reported in Michigan in 1902.

One plate—Deaths from tuberculosis per 10,000 inhabitants in England, Scotland, and Ireland, during each of the years, 1864-1902.

One plate—Deaths from pneumonia per 100,000 inhabitants, and the day and the night ozone in Michigan, during each of the years, 1872-97.

One plate—Death rate from pneumonia in Michigan, and the average atmospheric temperature at the Michigan Agricultural College, for each of the 26 years, 1872-97.

One plate—Death-rate from influenza per 100,000 inhabitants, and the day and the night ozone in Michigan for each of the 8 years, 1890-97.

One plate—Deaths from consumption per 100,000 inhabitants in Michigan for the year 1869, and subsequent periods of years.

One plate—Sickness from influenza, tonsillitis, bronchitis, pneumonia, and consumption, and the average atmospheric temperature in Michigan, 13 years, 1886-98

One plate—Isolation and disinfection restricted measles in Michigan in the 13 years, 1890-1902.

One plate—Isolation and disinfection restricted typhoid fever in Michigan in 1902.

Nine electrotype plates, treatment of the drowned.

One plate—Deaths in Michigan, 4 years, 1898-1901.

#### PROPERTY LOANED.

Many photo-engraved plates were loaned to the Robert Smith Printing Co., State Printers and Binders, Lansing, to be used in printing annual reports and other publications of this Board. Most of these plates have been returned, but a few still remain charged to them in the property book in this office. The plates will probably be returned as soon as the State Printers are through with them.

#### INSTRUMENTS PURCHASED SINCE LAST REPORT.

- One T square, ebony edges, 30 inch.
- "The improved ever-ready electric light."
- 3 Smith Premier Typewriters.\*
- 1 Letter press.
- 1 Office safe.
- 1 Comptometer.

#### METEOROLOGICAL INSTRUMENTS ISSUED.

One maximum self-registering thermometer (to replace one disabled by long use) to S. E. Wait, Traverse City.

#### METEOROLOGICAL INSTRUMENTS RETURNED.

One maximum self-registering thermometer, disabled by long use, by S. E. Wait, Traverse City.

#### METEOROLOGICAL INSTRUMENTS BROKEN.

No meteorological instruments were broken.

\* 8 other typewriters were bought in previous years for use in this office, but were overlooked in the invoices for those years.



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METEOROLOGICAL INSTRUMENTS AND OTHER PROPERTY ON HAND.

- 8 standard barometers (including one in use at this office).
- 5 maximum self-registering thermometers (including one in use at this office).
- 5 minimum self-registering thermometers (including one in use at this office).
- 6 dry-bulb thermometers (including two in use in this office).
- 4 wet-bulb thermometers (including one in use in this office).
- 2 rain-gauges (including one in use in this office).
- 11 measuring sticks for rain-gauges (including one in use in this office).
- 1 standard thermometer.
- 8 registering boards (including one in use at this office).
- 14 psychrometer boards (including one in use at this office).
- 8 minimum thermometer clips.
- 6 psychrometer clips.
- 9 screw bolts for registering thermometers.
- 10 pins for registering thermometers.
- 7 barometer boxes (including one in use in this office.)
- 2 caps for overflow tubes.
- 2 large galvanized iron pails, to measure snowfall.
- 1 Draper's self-registering thermometer.
- 2 anemometers, one in use in this office.
- 1 anemometer registering apparatus, Robinson's.
- 2 circular magnifying hand-glasses.
- 9 psychrometer cups, injured by use, can be repaired.
- 4 psychrometer cups, spoiled by rust and long use.
- 36 broken thermometers (includes all since observations have been taken).
- 1 hard rubber triangle, 13 inch.
- 1 hard rubber triangle, 6 inch.
- 1 dotting instrument.
- 1 parallel ruler, hard rubber.
- 1 bull's-eye lamp for taking meteorological observations.
- 1 lantern.
- 2 boxwood triangular scales, 12 inch.
- 2 steel-spring bow pens.
- 2 drawing pens, 4 inch.
- 2 drawing pens, 5½ inch.
- 1 divider, 5 inch.
- 1 compasses, with fixed needle point, pen, pencil point and lengthening bar.
- 1 border pen for broad lines, 6½ inch.
- ¼ doz. sable artist brushes, assorted sizes.
- ¼ doz. camel's hair brushes, assorted sizes.
- 10 yds. Universal drawing paper.
- 1 worn-out anemometer spindle.
- 1 hammer.
- 1 hatchet.
- 1 screw-driver.
- 4,300 slips of ozone test-paper.
- 1 T square, ebony edges, 30 inch.
- 1 T square, 48 inches.
- 11 Smith Premier typewriters.

- 1 "The improved ever-ready electric light" for taking meteorological observations.  
 1 office safe.  
 2 letter presses.  
 1 comptometer.  
 1 No. 1 Rotary Neostyle, exchanged for 1 No. 1 Electric Rotary Neostyle No. 4912.

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH (UNDER ACTS 81, 1873, 241, 1881 AND 140, 1901, TO PAY THE SALARY OF THE SECRETARY, THE INCIDENTAL EXPENSES OF THE OFFICE, THE EXPENSES FOR SANITARY CONVENTIONS, INSTRUMENTS, REPRINTS, ETC.), AS PER VOUCHERS 3595, 3602, 3613-14, 3621-29, 3631, 3633-42, 3644, 3646-3732 INCLUSIVE, 3735-42, 3757, 3771-72, 3778 AND 3784, DURING THE FISCAL YEAR ENDING JUNE 30, 1904.

Expenses of members:—	
Attending meetings.....	\$44 15
Other official.....	315 16
Engraving, drawing, etc.....	40 99
Instruments and books.....	380 37
Paper, stationery, etc.....	990 06
Postage.....	1,981 62
Printing and binding.....	713 57
Secretary.....	3,000 00
Expressage.....	53 27
Telegrams.....	13 24
Telephones.....	35 10
Miscellaneous.....	171 27
Total.....	\$7,738 80

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH (FOR EDUCATIONAL WORK IN CONNECTION WITH THE TEACHERS IN THE PUBLIC SCHOOLS), UNDER ACT 142, 1897, AS PER VOUCHERS 229, 231-32, 234-259 INCLUSIVE, DURING THE FISCAL YEAR ENDING JUNE 30, 1904.

Instruments and books.....	\$108 20
Paper, stationery, etc.....	733 82
Postage:—	
Office (amount appropriated, \$450.00; amount on hand at beginning of fiscal year, \$354.41; amount used, \$476.14; unexpended balance, working fund, \$328.27).....	508 38
Printing and binding.....	1,020 77
Expressage.....	71 62
Telephone.....	5 35
Miscellaneous.....	2 83
Total.....	\$2,450 97

### EXPENDITURES ON ACCOUNT OF THE BOARD.

NOTE.—The appropriations (\$10,500) at the disposal of the State Board of Health are for certain specified purposes, not including clerk hire, the publication of the annual report, or the expenses in the examination of plans for public buildings; those expenditures *on account of*, but not by the Board, are provided for by other acts of the legislature than those appropriating money to be expended by the Board; and the accounts are kept in other offices, not in the office of the State Board of Health. The accounts for clerk hire are kept by the Auditor General, and are reported in his annual report; the accounts for the publication of the annual report of this Board, and in the examination of plans for public buildings, are kept by the Board of State Auditors, and are published in the annual report of that Board.

Respectfully submitted.  
 HENRY B. BAKER,  
 Secretary.

SUMMARY FROM THE QUARTERLY REPORTS OF WORK IN THE  
OFFICE OF THE SECRETARY OF THE STATE BOARD OF  
HEALTH, AND OF THE CONDITION OF HEALTH  
IN MICHIGAN DURING THE SIX MONTHS  
ENDING JUNE 30, 1904.

For each regular meeting of the State Board of Health, the Secretary prepares a report of the work in the office, and of the condition of health in Michigan, during the preceding quarter.

In another article, further on in this volume, entitled "Communicable Diseases in Michigan During the Year 1903," is a summary, relative to the year 1903, abstracted from the quarterly reports.

This article is a similar summary, from the quarterly reports for the succeeding six months, being the first six months of the calendar year 1904.—the last half of the fiscal year 1904, for which year this volume is the annual report. This article brings the subject up to the latest date possible, for this report.

A summary of a few portions of the quarterly reports during the six months ending June 30, 1904, is as follows:

*Dangerous communicable diseases.*—Relative to the dangerous communicable diseases in Michigan, the number of instances in which action was taken during the six months, are as follows: For pneumonia 2,485; for consumption 869; for meningitis 225; for typhoid and typho malarial fever 333; for diphtheria 299; for whooping-cough 97; for measles 602; for scarlet fever 457; and for smallpox 437. Total for the nine diseases, 5,804.

The number of communications relative to dangerous communicable diseases, received and placed on file, was 18,243.

The number of communications relative to dangerous communicable diseases sent out, was 14,281.

The final reports received and filed were: For pneumonia 1,732; for consumption 1,013; for meningitis 235; for typhoid and typho-malarial fever 308; for diphtheria 286; for whooping-cough 53; for measles 362; for scarlet fever 504; and for smallpox 352. Total for the nine diseases 4,845.

The registration and return of deaths in Michigan, to the State Department, has resulted in giving this office the first information of the occurrence of 995 deaths from pneumonia; 571 deaths from consumption; 158 deaths from meningitis; 84 deaths from typhoid and typho-malarial fever; 47 deaths from diphtheria; 35 deaths from whooping-cough; 30 deaths from measles; 25 deaths from scarlet fever; and no deaths from smallpox. A total for the nine diseases of 1,945.

The local columns of 7,148 newspapers have been looked over for reports of occurrence of communicable diseases. (This work is usually done by the clerk who acts as messenger and janitor, in the intervals of his performance of other duties.) This has resulted in giving this office first information of the alleged occurrences of 566 cases of pneumonia; 42 cases of consumption; 5 cases of meningitis; 40 outbreaks of typhoid and typho-malarial fever; 7 outbreaks of diphtheria; 11 outbreaks of whooping-cough; 96 outbreaks of measles; 13 outbreaks of scarlet fever; and 20 outbreaks of smallpox. A total for the nine diseases of 800. To what extent the reports of these alleged outbreaks were verified is shown in the accompanying table.



## SUMMARY FROM QUARTERLY REPORTS, FISCAL YEAR 1904. xxxiii

TABLE 1.—FIRST SIX MONTHS OF 1904.—*Exhibiting the number of instances in which action was taken relative to pneumonia, consumption, meningitis, typhoid fever, diphtheria, whooping-cough, measles, scarlet fever and smallpox, from January 1 to June 30, 1904; the per cent of reports, first information concerning which was received through the newspapers; the per cent of newspaper reports which were confirmed by the health officer or by the death certificate; the per cent of reports which were denied, and the per cent of reports relative to which no reply was received, from the health officer.*

	Reports from all sources January 1, to June 30, 1904.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Pneumonia.....	2,485	23	26	17	57
Consumption.....	869	5	67	14	19
Meningitis.....	225	2	75	0	25
Typhoid fever.....	333	12	41	30	29
Diphtheria.....	299	2	80	0	20
Whooping-cough.....	97	11	13	12	75
Measles.....	602	16	47	10	43
Scarlet fever.....	457	3	55	7	48
Smallpox.....	437	5	49	30	21
Average for the nine diseases.....		14	35	17	48

*Work in connection with sickness statistics.*—When a return of the name of a new health officer was received, the printed circular [180] demanding the weekly card reports of sickness, and a hektographed circular letter describing the plan of making the card reports, together with supplies for making the reports, were sent to the health officer of each city and village, who were physicians, in active general practice of medicine. It must be remembered that the following applies only to the work on sickness statistics for the first six months of 1904, and that for the work of the calendar year 1903, reference must be made to the article on sickness statistics on subsequent pages of this report. During the first six months of the year 1904, 4,177 blank report, receipt and return postal cards, 377 weekly record books, and 517 printed hektographed and typewritten letters, were mailed to health officers of cities and villages, and to such physicians, in active practice of medicine, who have expressed a willingness to make the reports voluntary. About 2,772 weekly postal card reports were received and entered on the register.

The sickness statistics of Michigan, based upon these weekly card reports,

are probably the most important sickness statistics in the world, and are made especially useful for the purpose of studying the climatic causation of diseases, by reason of the excellent meteorological statistics which have been collected for a long series of years. The general plan of the weekly card reports, the sickness statistics obtained from the compilation of the weekly card reports received during the year 1903, and the data obtained from the meteorological observations during the year 1903, may be found on subsequent pages of this report.

An ephemeral use is made of the data contained in the weekly card reports, and of the meteorological observations at Lansing, by the publication of weekly, monthly and quarterly bulletins, "Health in Michigan." Sample of several bulletins may be found on page 85, Report for 1891, pages lxxix, and xcii-xciii, report for 1894, and pages lxxxvi-lxxxvii, report for 1898. During the first six months of 1904 about 115 copies of the weekly bulletin were mailed each week, and about 128 copies of the monthly bulletin were mailed each month, to members of the State Board of Health and other officials and persons interested in keeping a "finger on the public pulse," also to a number of newspapers and sanitary and medical journals.

*Meteorology at one central station, and sickness throughout Michigan from all causes, during the first six months of 1904, being the last six months of the fiscal year compared with the first six months of 1903.*—A comparison of meteorological conditions, at Lansing, for the first six months of 1904, with the meteorological conditions for the first six months of 1903, shows that in 1904, the prevailing direction of the wind was southwest and southeast, instead of southwest and northeast, the velocity .4 of a mile per hour less, the average temperature 5.31 degrees lower, the average daily range of temperature .02 of a degree less, the average daily range of atmospheric pressure .002 of an inch greater, the precipitation .08 of an inch less, the absolute humidity less, the relative humidity and the day and night ozone more, and the depth of water in the observation well 6 inches less. This data relative to the calendar year 1903 is printed in the article on meteorology, beginning on page 1 of this report.

Compared with the first six months of 1903, the reports from all sources indicate an increased prevalence in the sickness from consumption and dysentery; and a decreased prevalence in cholera morbus, erysipelas, intermittent fever, remittent fever, pneumonia, puerperal fever and whooping-cough, in the first six months of 1904.

*The weather and the health in Michigan in the first six months of 1904, compared with the average for the corresponding six months in the ten years, 1894-1903.*—A comparison of meteorological conditions, at Lansing, for the first six months of 1904, with the average for the corresponding six months in the ten years, 1894-1903, shows that in 1904 the prevailing direction of the wind was southwest and southeast, instead of southwest and northwest, the velocity one mile per hour less, the average temperature 4.35 degrees lower, the average daily range of temperature .1 of a degree greater, the average daily range of atmospheric pressure .006 of an inch greater, the precipitation .24 of an inch more, the absolute humidity less, the relative humidity more, the day and night ozone less, and the depth of water in the observation well 8 inches more.

Compared with the average in the corresponding six months in the ten years, 1894-1903, the reports from regular observers indicate that typhoid fever and smallpox were more prevalent than usual; and intermittent fever, remittent fever, dysentery, erysipelas, inflammation of bowels, meningitis, cholera infantum, cholera morbus, pneumonia, puerperal fever and whooping-cough, were less prevalent than usual, in the first six months of 1904.



[PART II.]

PRINCIPAL METEOROLOGICAL CONDITIONS IN MICHIGAN  
IN 1903.

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COMPARISONS OF CONDITIONS IN 1903 WITH THOSE IN PRECEDING  
YEARS.

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A COMPILATION OF REPORTS BY OBSERVERS FOR THE STATE BOARD OF HEALTH  
AND FOR THE UNITED STATES WEATHER BUREAU.

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COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE MICHIGAN STATE BOARD OF HEALTH.

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In the annual reports of this Board, there has been published for each of the years 1877 to 1902, inclusive, a summary relative to the principal meteorological conditions observed during the year. This paper continues the subject for the year 1903. The names of the observers for that year, and the months in that year for which copies of registers of meteorological conditions were received from each, are stated in Table I. In Table II, is given the latitude, longitude, and elevation of each of these stations. In the tables, reports received from any observer for less than half the year have not been used; in some instances the "casual phenomena," not in tabular form, are used.

The principal conditions treated in the tables are temperature, relative and absolute humidity of the air, cloudiness, fogs, rainfall, ground-water levels, ozone, velocity and direction of the wind, and pressure of the atmosphere. The facts in a table on the subject of each such important meteorological condition is illustrated by a diagram representing to the eye variations in the given condition from month to month through the year, at the several localities represented.

Some of these tables give not only the meteorological conditions for the year and month under consideration, but they also contain, for purposes of comparison, statements of the average conditions for the longest period available in each case.

In the latter part of the annual report for 1886, there was published an article on "The Causation of Pneumonia," in which extensive use was made of meteorological statistics, especially those relating to the meteorology of Michigan. In the annual report for 1887, in an article on "The Causation of the Cold-Weather Diseases," influenza, tonsillitis, bronchitis, scarlet fever, diphtheria, and smallpox are proved to sustain very close relations to meteorological conditions. Extensive use of meteorological and sickness

statistics is made in the report for 1887, in an article entitled "The Relations of Certain Meteorological Conditions to Diseases of the Lungs and Air-Passages." In the report for 1891, "Abstract of Proceedings, April 14, 1891," in a discussion on the subject of "The Causation of Influenza," is an important use of the meteorological data, with diagrams and other evidence, showing how closely influenza is associated with atmospheric temperature, humidity, ozone, and wind. In the report for 1891, page cxxvii, is an article entitled "Relations of Certain Meteorological Conditions to Diseases of the Lungs and Air-Passages in Colorado," in which are also data relative to other States and Countries. In the report for 1894, pages clix-ccxiv, is a paper on "The Causation of Influenza and Allied Diseases with Suggestions for their Prevention," in which important use is made of the meteorological data collected in Michigan since 1877. In each of the annual reports of this Board since that for the year 1877, considerable use has been made of the sickness statistics in Michigan for the complete study of which, data of the meteorological conditions coincident with the sickness is required. On subsequent pages of this report, for the year 1903, in the article on "The Time of Greatest Prevalence of Each Disease in Michigan, in 1902," is a table showing the relation of certain meteorological conditions to the prevalence of typhoid fever and diarrhea in Michigan in 1902.

The article in this annual report relative to "The Time of Greatest Prevalence of Each Disease in Michigan in 1902," based upon weekly reports of sickness in Michigan, may well be studied in connection with this article, the main purpose of which is to serve as a basis for studies of the causes of diseases.

It is believed that there is nowhere else so complete a statement of the facts relating to meteorology of Michigan as is here presented, for any use for which such knowledge may be needed, now or hereafter.

TABLE I.—Names of observers whose reports are summarized in the following meteorological tables and diagrams, their places of observation, and the counties and geographical divisions of the State in which these places are situated, and months for which reports were received from each observer.

Name of observer.	Place of observation.	County.	Divisions of the State.*	Months (inclusive) for which registers were received.
Henry R. Patrick, observer, U. S. Weather Bureau.....	Marquette.....	Marquette.....	U. P.	January to December.
A. G. Burns, observer, U. S. Weather Bureau.....	Sault Ste. Marie.....	Chippewa.....	U. P.	January to December.
S. E. Wait.....	Traverse City.....	Grand Traverse..	N. W.	January to December.
F. H. Duff, observer, U. S. Weather Bureau.....	Alpena.....	Alpena.....	N. E.	January to December.
D. W. Mitchell, M. D.....	Harrisville.....	Alcona.....	N. E.	January to December.
Edward A. Brown, observer, U. S. Weather Bureau.....	Port Huron.....	St. Clair.....	B. & E.	January to December.
John S. Caulkins, M. D.....	Thornville.....	Lapeer.....	B. & E.	January to December.
F. W. Robison, chemist.....	Agricultural College.....	Ingham.....	C.	January to December.
Wm. M. Force and Thos. S. Ainge.....	{ State Board of Health }	Ingham.....	C.	January to December.
Asaph Hall, Jr., director, Detroit Observatory.....	Ann Arbor.....	Washtenaw.....	S. C.	January to December.
Norman B. Conger, Inspector, U. S. Weather Bureau.....	Detroit.....	Wayne.....	S. E.	January to December.

\*The counties in each division are stated in Exhibit I, in the annual report for 1898 and preceding reports.

# METEOROLOGICAL CONDITIONS IN MICHIGAN IN 1903.

3

TABLE II.—*Latitude and longitude, elevation above sea level, and the average temperature and average barometric pressure in 1903, at meteorological stations in Michigan,—the names of the stations being arranged in order by latitude highest first.*

Localities in order of latitude, those farthest North, first.	Latitude North.	Longitude West from Greenwich.	Altitude (approximate) above sea level.—Feet.	Height of mercury in cistern of barometer above sea level.—Feet.	Average temperature 1903. Degrees Fabr.	Average atmospheric pressure 1903. Inches of mercury corrected for temp.
Marquette.....	46°34'	87°24'	669.	.....	.....	.....
Sault Ste. Marie.....	46°30'	84°21'	607.	614.	.....	.....
Alpena.....	45°5'	83°3'	587.	.....	.....	.....
Traverse City.....	44°45'	85°40'	598.	605.	44.59	.....
Harrisville.....	43°40'	83°30'	616.	.....	42.90	29.309
Grand Haven.....	43°5'	86°18'	590.	.....	.....	.....
Port Huron.....	43°0'	82°26'	602.	.....	.....	.....
Thornville.....	* 42°55'	* 83°10'	† 975.	† 980.	47.11	26.948
Agricultural College.....	42°44'	84°29'	820.	834.	46.78	28.984
Lansing, S. B. of H.....	‡ 42°44'	‡ 84°33'	§ 900.	917.	47.42	29.081
Detroit.....	42°20'	83°3'	730.	.....	.....	.....
Ann Arbor.....	42°17'	83°44'	930.	936.	47.10	29.041

\*Estimated from lines on a map of Michigan, issued by the General Land Office, Department of the Interior, 1878. For stations having no reference mark, the latitude and longitude were stated by the observer on the meteorological reports received.

†Estimated from data in Tackabury's Atlas of the State of Michigan.

‡The exact latitude and longitude of the astronomical post placed in the ground near the new Capitol at Lansing, by the U. S. Lake Survey in 1875, as determined by the observations then made, is 42° 43' 53.11" N and 84° 33' 19.68" W.

§Estimated from comparisons of the barometrical observations at Lansing, Port Huron, and Grand Haven for the four years, 1879-82.

NOTE.—Green's standard barometer was used at the above stations for the year 1903.

TABLE III.—*Average temperature by year and months, for the year 1903, and the average for the 26 years, 1877-1902. These averages are for groups of several stations in Michigan.*

Years, etc.....	Annual av.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
{ Average for 26 years, } 1877-1902.....	46.52	22.02	22.70	30.18	45.11	56.45	66.44	71.13	68.49	61.65	49.87	36.61	27.64
1903.....	45.98	22.74	23.74	39.45	44.39	58.23	61.38	69.84	64.69	60.73	50.74	34.55	21.26

TABLE IV.—*Average temperature by year and months, for the year 1903, and the average for the 24 years, 1879-1902, at the office of the State Board of Health, State Capitol, Lansing, Michigan.*

Years, etc.....	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
{ Average for 24 years, } 1879-1902.....	47.50	22.89	23.29	31.57	46.73	58.33	68.12	72.23	69.02	61.94	50.48	37.20	28.18
1903.....	47.42	24.27	24.74	41.52	46.48	61.28	62.87	71.22	66.16	62.10	51.31	35.16	21.97



TABLE V.—Average temperature by year and months, for the year 1903, and the average for the 39 years, 1864-1902, at the Agricultural College, Michigan.

Years, etc.....	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
{ Average for 39 years, 1864-1902..... }	46.71	22.14	23.05	31.07	46.21	58.12	67.79	71.56	68.90	60.76	48.74	35.81	26.56
1903.....	46.78	22.40	22.83	41.12	46.04	61.57	63.50	70.81	64.98	61.76	50.92	34.62	20.84

*Meteorological characteristics of the year 1903 in Michigan.*—At the several meteorological stations, in different parts of the State, the average temperature for 1903 was .54° lower than the average for the preceding twenty-six years; the annual range of temperature was 6° higher than in 1902, and 11° lower than the annual range for the preceding twenty-six years; the average monthly range of temperature was 3° higher than in 1902, and 7° less than the average for the preceding twenty-six years. The daily range of temperature was .02° more than in 1902, and 1.10° less than the average for the preceding twenty-four years. The average cloudiness was one per cent less than in 1902, and one per cent greater than the average for the preceding twenty-six years; the rainfall (rain and melted snow) was 1.39 inches more than in 1902, and 1.97 of an inch more than the average for the preceding twenty-six years; the average atmospheric pressure was .024 of an inch less than in 1902, and .059 of an inch less than the average for the preceding twenty-six years.

In Table VI, is given by year and months, a comparison of conditions in 1903, in Michigan, with those in 1902, and with the averages of periods of years. Naming the months in order of greatest difference, March, May, February, October and January were months in which the average temperature in 1903 was higher than the average for corresponding months in the preceding twenty-six years; December, June, August, November, July, September and April were months in which the average temperature in 1903 was lower than the average for corresponding months in the preceding twenty-six years.

TABLE VI.—*Statements of meteorological conditions in the year, and in each month of the year 1903, compared with the annual and monthly averages for 1902, and for several stated periods of years. These statements and averages are for groups of several stations in Michigan.*

Meteorological conditions.	1903 Compared with averages for previous years.		In 1903 more (+), or less (—), than in 1902.	Meteorological conditions.	1903 Compared with averages for previous years.		In 1903 more (+), or less (—), than in 1902.
	No. of years aver- aged, end'g with 1902.	More (+), or less (—), in 1903 than the average for previous years.			No. of years aver- aged, end'g with 1902.	More (+), or less (—), in 1903 than the average for previous years.	
YEAR 1903.				YEAR 1903.			
Av. temp.....	26	— .54°	— .82°	<i>Continued.</i>			
Range of temp.*.....	26	— 11°	+ 6°	Cloudiness.....	26	+ 1 per cent.	— 1 per cent.
Av. monthly range of temp.*.....	26	— 7°	+ 3°	Rainfall.....	26	+ 1.97 in.	+ 1.39 in.
Av. daily range of temp.*.	24	— 1.10°	+ .02°	Atmospheric pressure....	26	— .059 in.	— .024 in.
JANUARY.				FEBRUARY.			
Av. temp.....	26	+ .72°	— .19°	Av. temp.....	26	+ 1.04°	+ .2.63°
Range of temp*.....	26	— 11°	+ 4°	Range of temp.*.....	26	— 6°	+ 3°
Av. daily range of temp*..	24	— 1.77°	— .65°	Av. daily range of temp.*	24	— 1.11°	— .63°
Cloudiness.....	26	+ 4 per cent.	+ 8 per ct.	Cloudiness.....	26	— 1 per ct.	+ 8 per cent.
Rainfall.....	26	— .57 in.	+ .79 in.	Rainfall.....	26	+ .33 in.	+ 1.64 in.
Atmospheric pressure....	26	— 184 in.	— .219 in.	Atmospheric pressure.	26	— .058 in.	+ .041 in.
MARCH.				APRIL.			
Av. temp.....	26	+ 9.27°	+ 2.00°	Av. temp.....	26	— .72°	— .56°
Range of temp*.....	26	+ 3°	+ 6°	Range of temp.*.....	26	— 7°	— 4°
Av. daily range of temp.*.	24	— 2.00°	— 1.46°	Av. daily range of temp.*.....	24	— 1.73°	— .47°
Cloudiness.....	26	+ 7 per ct.	+ 14 per ct.	Cloudiness.....	26	— 1 per ct.	— 6 per ct.
Rainfall.....	26	— .17 in.	— .38 in.	Rainfall.....	26	+ .69 in.	+ 1.34 in.
Atmospheric pressure....	26	+ .082 in.	+ .125 in.	Atmospheric pressure.	26	— .133 in.	— .047 in.
MAY.				JUNE.			
Av. temp. ....	26	+ 1.78°	+ 1.17°	Av. temp.....	26	— 5.06°	— .15°
Range of temp.*.....	26	+ 3°	=	Range of temp.*.....	26	— 13°	— 4°
Av. daily range of temp.*.	24	+ .54°	+ 1.05°	Av. daily range of temp.*.....	24	— 2.83°	— .75°
Cloudiness.....	26	— 12 per ct.	— 13 per ct.	Cloudiness.....	26	+ 12 per ct.	— 1 per ct.
Rainfall.....	26	— .58 in.	— .86 in.	Rainfall.....	26	— .03 in.	— 1.60 in.
Atmospheric pressure....	26	+ .061 in.	+ .010 in.	Atmospheric pressure....	26	— .062 in.	+ .005 in.

\* By registering thermometers.

Comments on Table VI are printed on page 4.

The high temperature for March and the large amount of rainfall for August are especially noticeable.

TABLE VI.—CONTINUED.—*Meteorological conditions at stations in Michigan, in months, for the year 1903, compared with averages for corresponding months in preceding years.*

Meteorological conditions.	1903 Compared with averages for previous years.		In 1903 more (+), or less (—), than in 1902.	Meteorological conditions.	1903 Compared with averages for previous years.		In 1903 more (+), or less (—), than in 1902.
	No. of years aver- aged, end'g with 1902.	More (+), or less (—), in 1903 than the average for previous years.			No. of years aver- aged, end'g with 1902.	More (+), or less (—), in 1903 than the average for previous years.	
JULY.				AUGUST.			
Av. temp.....	26	—1.29°	—1.25°	Av. temp.....	26	—3.80°	— .93°
Range of temp.*.....	26	—9°	=	Range of temp.*.....	26	—13°	—2°
Av. daily range of temp.*.	24	—1.40°	+ .41°	Av. daily range of temp.*.....	24	—3.91°	—2.82°
Cloudiness.....	26	+7 per ct.	—5 per ct.	Cloudiness.....	26	+17 per ct.	+18 per ct.
Rainfall.....	26	+1.52 in.	—1.45 in.	Rainfall.....	26	+2.03 in.	+3.27 in.
Atmospheric pressure...	26	— .070 in	— .044 in.	Atmospheric pressure.	26	— .075 in.	— .045 in.
SEPTEMBER.				OCTOBER.			
Av. temp.*.....	26	— .92°	+1.19°	Av. temp.....	26	+ .87°	+1.20°
Range of temp.*.....	26	—7°	+9°	Range of temp.*.....	26	—8°	+6°
Av. daily range of temp.*.	24	— .53°	+2.31°	Av. daily range of temp.*.....	24	+ .72°	+ .47°
Cloudiness.....	26	+1 per ct.	—13 per ct.	Cloudiness.....	26	—12 per ct.	—13 per ct.
Rainfall.....	26	+ .39 in.	— .96 in.	Rainfall.....	26	— .86 in.	— .36 in.
Atmospheric pressure...	26	— .017 in.	+ .061 in.	Atmospheric pressure....	26	— .051 in.	— .025 in.
NOVEMBER.				DECEMBER.			
Av. temp.....	26	—2.06°	—9.87°	Av. temp.....	26	—6.38°	—5.15°
Range of temp.*.....	26	+3°	+14°	Range of temp.*.....	26	—10°	+6°
Av. daily range of temp.*.	24	+ .44°	+ .73°	Av. daily range of temp.*.....	24	+ .37°	+2.08°
Cloudiness.....	26	—11 per ct.	—10 per ct.	Cloudiness.....	26	+3 per ct.	—1 per ct.
Rainfall.....	26	— .60 in.	— .03 in.	Rainfall.....	26	— .16 in.	+ .01 in.
Atmospheric pressure....	26	— .062 in.	— .017 in.	Atmospheric pressure....	26	— .141 in.	— .131 in.

\*By registering thermometers.

*Representative data.*—Whoever will carefully study Diagram I, in this article, and in similar articles for preceding years, will see that thermometers and methods of observation have become so perfect that, given a curve representing correctly the temperature by months at one station in Michigan, curves can readily be constructed without actual records, which will somewhat closely represent the temperature at each of several other stations, because the curves for many stations run so nearly parallel that all that is necessary to do is to find the average difference of mean annual temperature at the

station to be represented compared with the station for which the data are given. It may also be seen that a curve representing the temperature at a station in the central part of the State very closely resembles the curve representing the average for many stations representing nearly all parts of the State. This proves that the practice adopted many years ago of using statements of some of the meteorological characteristics at one central station is a reasonably safe practice, and it is especially useful when it enables us to gain a comparison for a longer period than can be made from records at many stations, and also when employed in advance of the receipt of records from all stations, as is the case when the weekly bulletins of "Health in Michigan" are issued, for the purposes for which the meteorological conditions at the State Capitol are used to represent the conditions probably prevailing throughout the State.

That a curve exhibiting the results of the observations of *one* skillful observer, in the central part of the State, using an instrument of precision (a standard thermometer costing about three dollars), is substantially like a curve for the average of other localities, is a fact of very great importance in statistics; proving, as it does, that when great care is taken to ensure accuracy of observation, representative data are reasonably accurate and reliable; even the data collected by one observer may represent an entire State with sufficient accuracy for most practical purposes.

#### LOCAL METEOROLOGICAL PHENOMENA IN THE SEVERAL MONTHS OF THE YEAR 1903.

The following general remarks relative to temperature, frosts, effects on vegetation, migration of birds, etc., in 1903, are taken from the monthly reports by observers. The names of stations are appended; the names of observers are stated in Table I:

##### JANUARY.

Jan. 3, trees loaded with rime. Jan. 26, thaw began; did not freeze at night.

January was a very good winter month—temperature about the long average—some fair sleighing, a little zero weather and some high winds. More snow is desirable to cover the wheat, rye and clover.—*Thornville*.

Sleighing, Jan. 1 to 26, inclusive. Depth of snow on ground, Jan 15, 5 inches. Jan. 31, none.—*Lansing*.

Depth of snow on ground, Jan. 15, 7.2 inches. Jan. 31, trace.—*Detroit*.

##### FEBRUARY.

Grand Traverse Bay frozen over, Feb. 17, but not completely. See statement in March.—*Traverse City*.

Feb. 1, did not freeze at night. Ice storm, Feb. 3. Trees loaded with ice, Feb. 4. Snow melting, Feb. 9, 10. Thaw beginning, Feb. 25. Snow about gone, Feb. 27. February was a very good winter month, only 3 days of zero weather, good sleighing. Winter crops well protected with snow, ground not deeply frozen.—*Thornville*.

Sleighing, Feb. 4, 5, 6, 7, 8, 9, 10, 11, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25.—*Lansing*.

##### MARCH.

Mar. 10, robins arrive. Ice all goes out of West Bay.

Mar. 11. Grand Traverse Bay has not been completely frozen over this winter—froze out about three miles on West Bay on Feb. 17. East Bay has been practically open all winter. First thunder storm March 17.—*Traverse City*.

Warmest March on record at Alpena.—*Alpena*.

Killing frosts, Mar. 22, 26, 28, 29, 30, 31.—*Port Huron*.

Robins seen, Mar. 5; bluebirds, Mar. 10; blackbirds, Mar. 21; song sparrows, Mar. 22. Grass and wheat began to grow, about Mar. 10. Lilac buds swelled, Mar. 18. Crocus in



blossom Mar. 11. March was an unusually fine, warm month for the season, with no hard freezes and one week like May—few high winds and small rainfall.—*Thornville*.

First robin seen, Mar. 2. Ice began moving in Grand River, Mar. 4. Grand River open Mar. 6 at high water mark.

First thunder storm, Mar. 7. Crocus in bloom, Mar. 6. Crow appeared, Mar. 10; blue-birds and song sparrows, Mar. 14. Wild geese flying north, Mar. 14. Frost out of ground, except on north side of buildings, Mar. 14. No snow on ground, Mar. 15. Frogs heard, Mar. 15. Bees out, Mar. 16. Pussy willow budding, Mar. 19.—*Lansing*.

Heavy frosts, Mar. 23, 26, 29, 30, 31.—*Sault Ste. Marie*.

#### APRIL.

Heavy frost Apr. 25. Killing frost Apr. 30.—*Marquette*.

Heavy frost, Apr. 1, 10. Killing frosts, Apr. 17, 18, 20, 23, 27.—*Sault Ste. Marie*.

Light frost, Apr. 27. Heavy frosts, Apr. 1, 5, 8, 10, 17, 18, 19, 23.—*Alpena*.

Light frost, Apr. 20. Killing frosts, Apr. 1, 21, 23.—*Port Huron*.

Dandelions in blossom, Apr. 23. Apple trees leafing, Apr. 28. Sweet cherries in blossom Apr. 29. April was rather a cold, backward month—nights very cold, mostly. Favorable enough for work but not for growth. Nothing that has been put in the ground is up yet, as the month closes, except peas. Wheat and rye are not looking as well as they were when the snow went off.—*Thornville*.

Thunderstorm, Apr. 2. Frosts, Apr. 17, 18, 21, 23, 27. Ground froze, Apr. 3, 4, 23. Workmen commenced mowing Capitol lawn, Apr. 13. Lilacs leafing, Apr. 17. Cherry trees in blossom, Apr. 27. Dandelions in blossom, Apr. 28. Plum trees in blossom, Apr. 28. Maple, horse-chestnut and ginkgo trees leafing, Apr. 29. Apricots in blossom, Apr. 29.—*Lansing*.

Light frosts, Apr. 1, 21, 23, 26, 27. Heavy frosts, Apr. 5.—*Detroit*.

#### MAY.

Light frosts, May 6, 14, 29, 30. Heavy frost, May 7.—*Marquette*.

Light frosts, May 7, 9, 15, 29, 30. Heavy frosts, May 4, 8.—*Alpena*.

Light frosts, May 8, 30. Heavy frost, May 5. Killing frosts, May 1, 2, 4.—*Port Huron*.

Soil becoming dry and hard, bad for plowing, May 11. Thunder storm, May 27. May was a dry month with little hot weather and mostly cool nights. The soil became very hard and difficult to plow well, making farm work drag. When the heavy rains of May 26 and 27 came, much corn ground ready to plant had to be refitted. As a consequence there is still considerable not yet planted.—*Thornville*.

Light frosts, May 2, 8. Killing frosts, May 1, 4. Ice formed, May 1. Bobolinks heard, May 2; meadow larks, May 7; red birds, May 9. Apple trees in bloom, May 10.—*Lansing*.

Light frost, May 8. Heavy frosts, May 1, 4.—*Detroit*.

Killing frosts, May 2, 4.—*Ann Arbor*.

#### JUNE.

Light frost, June 12.—*Sault Ste. Marie*.

Light frost, June 12.—*Alpena*.

June was a wet month. The rain has made the planting of beans and potatoes very late, and hindered cultivation of corn. There is very little hay cut and there are still beans to plant.—*Thornville*.

#### JULY.

The only notable phenomenon of the month was the storm on the 21st inst. There was a heavy rain beginning about 3 P. M. At 6 P. M. there was a gale of wind and a fall of hailstones of large size. Windows were broken, trees blown down, crops and gardens badly hurt—corn the worst—being prostrated by the wind and the leaves slitted up by the hail.

The month was quite cool for the season, the nights especially so. A very poor year for corn, the poorest for many years. Grass was a good crop and so is rye. Wheat is fine, the little there is of it. No prospect of an apple crop.—*Thornville*.

#### AUGUST.

August was a cool, cloudy, wet month, having only three days in which the maximum temperature was 80° or above. The heavy rains hindered work and damaged late oats and hay largely. The cool nights and cloudy days were unfavorable for the curing of corn and the prospects for that crop are poor.

*Aurora.*

The aurora of the 21st, in its first appearance showed a very unusual feature, one at least that I do not remember ever to have seen before. After taking the 9:00 P. M. observations, I glanced up at the comet and saw in its exact locality a brush of white light about half a degree in length. The effect was at first really startling, as if the comet had blazed out all of a sudden from its obscurity into a brilliant and conspicuous object. A second look showed a large number of these same brushes of light scattered over the north part of the sky. These gradually disappeared, and a low arch of white light formed—no dark bank below, and no dancing rays. At 11 o'clock the arch was yet there with small patches of the same white light above it, as high as Polaris. At 2:30 A. M. everything had disappeared.—*Thornville.*

Katydid heard, Aug. 5.—*Lansing.*

## SEPTEMBER.

Light frost, Sept. 18. Heavy frosts, Sept. 6, 27, 29.—*Marquette.*

Light frosts, Sept. 5, 6, 22. Heavy frosts, Sept. 28, 29.—*Sault Ste. Marie.*

Light frosts, Sept. 18, 19, 22. Heavy frost, Sept. 28. Killing frost, Sept. 29.—*Alpena.*

Light frosts, Sept. 18, 28.—*Port Huron.*

Light frosts, Sept. 6, 24, 25. Heavy frost, Sept. 29.—*Thornville.*

Light frosts, Sept. 18, 24, 28, 29.—*Lansing.*

Light frosts, Sept. 19, 24, 28.—*Detroit.*

## OCTOBER.

Light frost, Oct. 2. Heavy frosts, Oct. 5, 9. Killing frost, Oct. 10.—*Marquette.*

Heavy frosts, Oct. 2, 9. Killing frost, Oct. 10.—*Sault Ste. Marie.*

Heavy frost, Oct. 18. Killing frost, Oct. 23.—*Port Huron.*

Aurora, Oct. 12, 13, 27. October was a dry, very pleasant month, favorable for all kinds of farm work.—*Thornville.*

Light frosts, Oct. 10, 11, 13, 21, 25. Killing frost, Oct. 18. First general killing frosts, Oct. 24, 26, 27. Ice formed, Oct. 18, 24, 26, 27. Snow, first of season, Oct. 23. Ground froze, Oct. 24, first of season—and on Oct. 27. Ice formed at Dr. H. B. Baker's residence one-fourth of an inch thick, morning of Oct. 24. Ice formed at T. S. Ainge's residence,  $\frac{1}{2}$  of an inch thick, morning of October 24.—*Lansing.*

Light frosts, Oct. 10, 13, 18. Heavy frost, Oct. 23. Killing frost, Oct. 24.—*Detroit.*

## NOVEMBER.

First snow storm of season, Nov. 23. November was a dry month and last half decidedly wintry—the first half having pleasant with much unclouded weather. It closes with several inches of frost in the ground which is slightly covered with snow.—*Thornville.*

Indian Summer, Nov. 1, 2, 3, 4, 9, 10, 22, 23, 28. Ground froze, Nov. 6, 7, 8, 12, 13, 18. Ice formed, Nov. 6, 7, 8, 12, 13. Grand River frozen over in places, Nov. 20, first of season. Temp., morning of Nov. 20, 7° lowest for Nov., since 1895. Grand River closed, Nov. 26, first of season. Depth of snow on ground, Nov. 30, 1 inch.—*Lansing.*

## DECEMBER.

Trees and bushes loaded with rime, Dec. 3. Trees and bushes loaded with wet snow—almost ice, Dec. 20. Ice on trees and bushes, Dec. 21. December was a cold, stormy, rough month with excellent sleighing after the 12th. Frost in the ground is not deep—in the woods very little. Snow in the woods is over two feet deep. It lies well in the open, covering the wheat perfectly.—*Thornville.*

Skating on Grand River, Dec. 2, first of season. Sleighing, Dec. 12, first of season. Sleighing, Dec. 12 to 31, inclusive. Depth of snow on ground, Dec. 31, seven and one-half inches.—*Lansing.*

TABLE VII.—Depth of wells; depth of ground above water in well; temperature of water in well, and day of observation of such temperature, in each month of the year 1903, as reported by meteorological observers for the State Board of Health. (The small figures above and at the right of the numbers denoting the degrees of temperature, state the day of the month on which the observation was made.)

Stations in Michigan.	January.			February.			March.			April.			May.			June.		
	Depth of well— Ft. in.	Depth of ground above water in well—Ft. in.	Temp. of water in well—Deg. Fahr.	Depth of well— Ft. in.	Depth of ground above water in well—Ft. in.	Temp. of water in well—Deg. Fahr.	Depth of well— Ft. in.	Depth of ground above water in well—Ft. in.	Temp. of water in well—Deg. Fahr.	Depth of well— Ft. in.	Depth of ground above water in well—Ft. in.	Temp. of water in well—Deg. Fahr.	Depth of well— Ft. in.	Depth of ground above water in well—Ft. in.	Temp. of water in well—Deg. Fahr.	Depth of well— Ft. in.	Depth of ground above water in well—Ft. in.	Temp. of water in well—Deg. Fahr.
Traverse City* . . . . .	55	41 4	46 <sup>22</sup>	55	41	46 <sup>24</sup>	55	41	48 <sup>21</sup>	55	41	48 <sup>30</sup>	55	40 4	48 <sup>27</sup>	41	24 5	48 <sup>30</sup>
Lansing, S. B. of H. . . . .	26 11½	25 5½	51 <sup>15</sup>	26 11½	25 2	50 <sup>14</sup>	26 11½	24 9	50 <sup>16</sup>	26 11½	24 4½	49 <sup>16</sup>	26 11½	24 3½	50 <sup>16</sup>	24 5	50 <sup>24</sup>	50 <sup>24</sup>
Ann Arbor . . . . .	14 10	8 7	39 <sup>19</sup>	14 10	8 4½	42 <sup>14</sup>	14 10	6	42 <sup>18</sup>	14 10	7 4	43 <sup>22</sup>	14 10	8 7	48 <sup>17</sup>	14 10	9 6	49 <sup>16</sup>
Stations in Michigan.	July.			August.			September.			October.			November.			December.		
	Depth of well— Ft. in.	Depth of ground above water in well—Ft. in.	Temp. of water in well—Deg. Fahr.	Depth of well— Ft. in.	Depth of ground above water in well—Ft. in.	Temp. of water in well—Deg. Fahr.	Depth of well— Ft. in.	Depth of ground above water in well—Ft. in.	Temp. of water in well—Deg. Fahr.	Depth of well— Ft. in.	Depth of ground above water in well—Ft. in.	Temp. of water in well—Deg. Fahr.	Depth of well— Ft. in.	Depth of ground above water in well—Ft. in.	Temp. of water in well—Deg. Fahr.	Depth of well— Ft. in.	Depth of ground above water in well—Ft. in.	Temp. of water in well—Deg. Fahr.
Traverse City* . . . . .	55	40 10	47 <sup>20</sup>	55	41	47 <sup>26</sup>	55	41	47 <sup>30</sup>	55	41	47	55	48 5	48 <sup>21</sup>	49	25 2½	48 <sup>23</sup>
Lansing, S. B. of H. . . . .	26 11½	24 6½	50 <sup>16</sup>	26 11½	24 7½	51 <sup>17</sup>	26 11½	24 6	52 <sup>15</sup>	26 11½	24 5	53 <sup>16</sup>	26 11½	24 5½	52 <sup>16</sup>	25 2½	51 <sup>16</sup>	51 <sup>16</sup>
Ann Arbor . . . . .	14 10	10 2	54 <sup>15</sup>	14 10	10 8	52 <sup>17</sup>	14 10	10 7	56 <sup>20</sup>	14 10	10 11	53 <sup>17</sup>	14 10	11 3	46 <sup>17</sup>	14 10	11 6	41 <sup>16</sup>

\*At Northern Michigan Asylum, Alfred Newman, observer.

N.B.—The small figures above and at the right of the numbers denoting the degrees of temperature, state the day of the month on which the observation was made.

*Temperature of the atmosphere.*—The average temperature by months, for the twenty-four years, 1879–1902, at Lansing, and a comparison of 1903, by months, with that average, are stated in Table XI.

The average temperatures at each of six stations in Michigan, and the average for the six stations in 1903, and in each month of that year, are stated in Table IX.

TABLE VIII.—Average temperature by year and months in 1903, compared with annual and monthly averages for 1902, and for the 26 years, 1877–1902.\* These averages are for groups of several stations in Michigan.

Years, etc.	Average temperature.—Degrees Fahr.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 26 yrs., 1877–1902....	46.52	22.02	22.70	30.18	45.11	56.45	66.44	71.13	68.49	61.65	49.87	36.61	27.64
Av. 24 yrs., 1879–1902...	46.32	21.92	22.01	29.89	44.74	56.45	66.45	70.93	68.31	61.46	49.74	36.50	27.46
1902 (6 stations).....	46.80	22.93	21.11	37.45	44.95	57.06	61.53	71.09	65.62	59.54	49.54	44.42	26.41
1903 (6 stations).....	45.98	22.74	23.74	39.45	44.39	58.23	61.38	69.84	64.69	60.73	50.74	34.55	21.26
In 1903 <b>higher</b> than av. for 26 years, 1877–1902 .....		.72	1.04	9.27		1.78					.87		
In 1903 <b>lower</b> than av. for 26 years, 1877–1902..	.54				.72		5.06	1.29	3.80	.92		2.06	6.38
In 1903 <b>higher</b> than in 1902.....			2.63	2.00		1.17				1.19	1.20		
In 1903 <b>lower</b> than in 1902.....	.82	.19			.56		.15	1.25	.93			9.87	5.15

\* At from 9 to 22 stations per year for the 25 years, 1877–1901. Just which stations in each year, up to 1897, are shown on page 17, report for 1898.

NOTE.—Beginning with the year 1885, allowance must be made for Lansing in Table VIII, because of a change in location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, report for 1886.

The average annual and monthly temperatures at from six to twenty-two stations for a period of twenty-six years, 1877–1902, are stated in Table VIII, in which is also given, by months, a comparison of 1903 with the average for 1902, and with the averages for the twenty-six years, 1877–1902. By Table VIII, which gives averages for groups of several stations in Michigan, it appears that in 1903 the mean temperature in January, April, June, July, August, November and December was lower than in those months in 1902. It also appears that January, February, March, May and October were warmer than the average temperature for the corresponding months for the Twenty-six years, 1877–1902.



DIAGRAM I.—AVERAGE TEMPERATURE BY MONTHS, 1903.

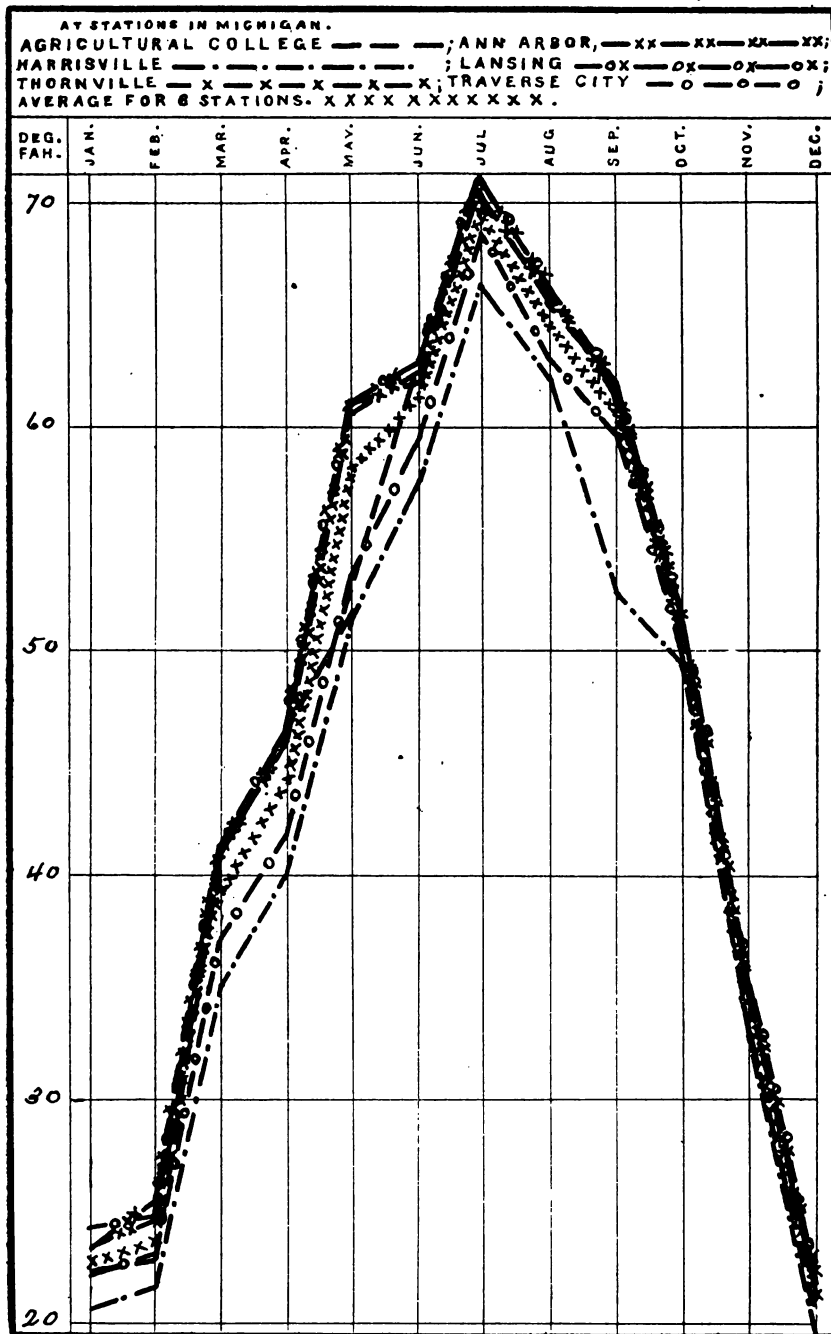


TABLE IX.—Average temperature in degrees Fahr., for the year, and by months of the year 1903, at each of 6 stations in Michigan, and also an average line for the 6 stations. From observations made daily at 7 A. M., 2 P. M., and 9 P. M., local time, by observers\* for the State Board of Health.

Stations in Michigan.*	Divisions of the State.†	Temperature in degrees Fahr.													
		Year.		Months, ‡ 1903.											
		Norm. §	1903.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.
Av. for 6 stations.....			45.98	22.74	23.74	39.45	44.39	58.23	61.38	69.84	64.69	60.73	50.74	34.55	21.26
Traverse City.....	N. W.	44.47 <sup>31</sup>	44.59 <sup>c</sup>	22.19	23.07	37.08	41.83 <sup>g</sup>	53.47 <sup>d</sup>	59.64 <sup>b</sup>	68.72 <sup>e</sup>	62.99 <sup>f</sup>	59.60	50.00	34.84	21.61
Harrisville.....	N E.	43.11 <sup>15</sup>	42.90	20.68	21.76	35.19	39.98	51.47	57.66	66.42	62.19	57.63	49.37	32.92	19.55
Thornville.....	B. & E.	47.93 <sup>27</sup>	47.11	23.40	25.33	40.68	45.89	60.88	62.00	70.57	65.73	61.98	51.54	35.06	22.31
Agricultural College....	C.	46.72 <sup>40</sup>	46.78	22.40	22.83	41.12 <sup>c</sup>	46.04 <sup>e</sup>	61.57 <sup>a</sup>	63.50 <sup>h</sup>	70.81	64.98	61.76	50.92	34.62	20.84
Lansing, S. B. of H.¶....	C.	47.50 <sup>25</sup>	47.42	24.27	24.74	41.52	46.48	61.28	62.87	71.22	66.16	62.10	51.31	35.16	21.97
Ann Arbor.....	S. C.	47.30 <sup>23</sup>	47.10	23.49	24.70	41.10	46.10	60.70	62.60	71.30	66.10	61.30	51.30	34.70	21.30

\* The names of observers, their place of observation, and the counties in which these places are situated, are stated in Table I.

† The names of divisions, and the counties in each, are stated in Exhibit I, in the annual report for 1898 and preceding reports.

‡ The computations for average temperature, as tabulated for months in 1903 at Ann Arbor, were made by the observer there. All other computations in Table IX were made at the office of the State Board of Health.

§ Numbers in this column state the average annual temperature for periods of years ending in each case with December 31, 1903. The small figures above and at the right of numbers which state the temperature, denote the number of years included in the average.

¶ From the sum of the means of the maximum and minimum thermometers divided by 2.

|| Beginning with the year, 1885, allowance must be made for Lansing in Table IX, because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, report for 1886.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d for 26 days. e For 25 days. f For 24 days. g For 20 days. h For 16 days.

[NOTE.] At the Agricultural College the maximum and minimum, and dry and wet bulb thermometers were removed from the ravine to higher ground, near the veterinary building, September 15, 1903.

The average line and lines for the six representative stations in Table IX are graphically represented in Diagram I.

The average daily range of temperature at from 6 to 19 stations per year, by months, for a period of twenty-four years, 1879-1902, and a comparison of 1903 with the monthly averages for that period and for 1902, are given in Table XIII. The highest and lowest temperatures in every month in 1903, at each of ten stations, are stated in Table XIV. The average daily range of temperature by months in 1903, at each of eleven stations, and the average for the eleven stations, are stated in Table XV. The lines for each of these stations, and the average line for the eleven stations, are represented in Diagram II. It will be noticed that the greatest *average* daily range of the eleven stations occurred during the months of May, July and September, but there were wide differences in the several stations.

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TABLE X.—Comparison of the average temperature during the year and during each month of the year 1903, with the annual and with the monthly averages for the year 1902, and with the averages for the 39 years, 1864–1902. Observations made by F. W. Robison, at the State Agricultural College, near Lansing, Mich.

Years, etc.	Average temperature.—Degrees Fahr.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 39 years, 1864-1902..	46.71	22.14	23.05	31.07	46.21	58.12	67.79	71.56	68.90	60.76	48.74	35.81	26.56
1902.....	47.24	22.09	19.52	38.37	45.80	60.19	63.78	72.62	64.75	59.38	49.98	44.12	26.28
1903.....	46.78	22.40	22.83	41.12	46.04	61.57	63.50	70.81	64.98	61.76	50.92	34.62	20.84
In 1903 higher than av. for 39 years, 1864-1902..	.07	.26	.....	10.05	.....	3.45	.....	.....	.....	1.00	2.18	.....	.....
In 1903 lower than av. for 39 years, 1864-1902..	.....	.....	.22	.....	.17	.....	4.29	.75	3.92	.....	.....	1.19	5.72
In 1903 higher than in 1902.....	.....	.31	3.31	2.75	.24	1.38	.....	.....	.23	2.38	.94	.....	.....
In 1903 lower than in 1902.....	.46	.....	.....	.....	.....	.....	.28	1.81	.....	.....	.....	9.50	5.44

TABLE XI.—Average temperature by year and months in 1903\* compared with annual and monthly averages for 1902, and for the 24 years, 1879–1902. Observations made at office State Board of Health, State Capitol, Lansing, Mich.

Years, etc.	Average temperature.—Degrees Fahr.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 24 years, 1879-1902..	47.50	22.89	23.29	31.57	46.73	58.33	68.12	72.23	69.02	61.94	50.48	37.20	28.18
1902.....	48.19	23.94	22.11	38.98	46.60	59.98	63.90	72.17	66.42	60.27	51.03	45.84	27.02
1903.....	47.42	24.27	24.74	41.52	46.48	61.28	62.87	71.22	66.16	62.10	51.31	35.16	21.97
In 1903 <b>higher</b> than av. for 24 years, 1879-1902..	.....	1.38	1.45	9.95	.....	2.95	.....	.....	.....	.16	.83	.....	.....
In 1903 <b>lower</b> than av. for 24 years, 1879-1902..	.08	.....	.....	.....	.25	.....	5.25	1.01	2.86	.....	.....	2.04	6.21
In 1903 <b>higher</b> than in 1902.....	.....	.33	2.63	2.54	.....	1.30	.....	.....	.....	1.83	.28	.....	.....
In 1903 <b>lower</b> than in 1902.....	.77	.....	.....	.....	.12	.....	1.03	.95	.26	.....	.....	10.68	5.05

\* Beginning with the year 1885, slight allowance should be made for Lansing in Exhibit 10, because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, report for 1886.

TABLE XII.—Average temperature in degrees Fahr., for the year and months, 1903, at office State Board of Health, State Capitol, Lansing, Michigan, computed from readings at 7 A. M., 2 P. M. and 9 P. M. daily, from registers of the Draper self-recording thermometer, compared with observations made with Green's standard mercurial thermometer at the same hours; both thermometers placed in latticed shelter for instruments, in the southwest part of the Capitol yard.

Tri-daily readings of instruments specified.	Year.	Average temperature, in degrees Fahr. Year and months, 1903.											
		Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. temp. from tri-daily observations with Green's standard mercurial thermometer.....	47.42	24.27	24.74	41.52	46.48	61.28	62.87	71.22	66.16	62.10	51.31	35.16	21.97
Av. temp. computed from readings of Draper's self-recording thermometer..	45.75	23.72	24.06	39.70	44.89	59.16	60.29	68.41	63.30	59.84	49.27	34.76	21.63
Lower by Draper's than by Green's thermometer	1.67	.55	.68	1.82	1.59	2.12	2.58	2.81	2.86	2.26	2.04	.40	.34

TABLE XIII.—Average daily range of temperature, by year and months, in 1903, compared with annual and monthly averages for 1902, and for the 24 years, 1879-1902.\* These averages are for groups of several stations in Michigan.

Years, etc.	Average daily range of temperature.—Degrees Fahr.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 24 years, 1879-1902...	17.92	15.19	16.78	17.17	19.01	20.21	20.73	20.92	20.41	20.00	17.60	14.02	12.99
1902 (12 stations).....	16.80	14.07	16.30	16.63	17.75	19.70	18.65	19.11	19.32	17.16	17.85	13.73	11.28
1903 (11 stations).....	16.82	13.42	15.67	15.17	17.8	20.75	17.90	19.52	16.50	19.47	18.32	14.46	13.36
In 1903 greater than av. for 24 years, 1879-1902..						.54					.72	.44	.37
In 1903 less than av. for 24 years, 1879-1902.	1.10	1.77	1.11	2.00	1.73		2.83	1.40	3.91	.53			
In 1903 greater than in 1902.....	.02					1.05		.41		2.31	.47	.73	2.08
In 1903 less than in 1902.....		.65	.63	1.46	.47		.75		2.82				

\* At from 6 to 19 stations per year for the 24 years, 1879-1902. Just which stations in each year, up to 1897, are shown on page 21, report for 1898.





METEOROLOGICAL CONDITIONS IN MICHIGAN IN 1903.

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TABLE XIV.—*Extremes of temperature and days of month on which the highest and the lowest, at each of 10 stations in Michigan, as indicated by daily readings of registering ther-*

Line number.	Stations in Michigan.* (Those of the U. S. Weather Bureau in italics.)	Year 1903.			January.		February.		March.		April.		May.	
		Highest.	Lowest.	Range.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1	At 10 Stations†. . . . .	94	-20	114	53	-9	50	-20	81	-1	80	13	90	21
2	Marquette‡. . . . .	94	-14	108	42 <sup>1</sup>	1 <sup>10</sup>	45 <sup>10</sup>	-14 <sup>17</sup>	56 <sup>30</sup>	8 <sup>1</sup>	71 <sup>27</sup>	23 <sup>4</sup>	88 <sup>17</sup>	24 <sup>1</sup>
3	Sault Ste. Marie‡. . . . .	87	-20	107	37 <sup>1</sup>	-9 <sup>8</sup>	43 <sup>26</sup>	-20 <sup>17</sup>	50 <sup>19</sup>	-1 <sup>1</sup>	68 <sup>28</sup>	14 <sup>4</sup>	83 <sup>17</sup>	21 <sup>1</sup>
4	Traverse City§. . . . .	93	-5	98	42 <sup>20</sup>	0 <sup>24</sup>	46 <sup>10</sup>	-5 <sup>17,18</sup>	75 <sup>19</sup>	16 <sup>1</sup>	75 <sup>28</sup>	18 <sup>4</sup>	90 <sup>18</sup>	32 <sup>3,6</sup>
5	Alpena‡. . . . .	93	-9	102	43 <sup>1</sup>	-8 <sup>8</sup>	46 <sup>26</sup>	-8 <sup>17</sup>	73 <sup>19</sup>	7 <sup>1</sup>	76 <sup>28</sup>	19 <sup>5</sup>	84 <sup>18</sup>	23 <sup>1</sup>
6	Harrisville§. . . . .	94	-11	105	42 <sup>20</sup>	-8 <sup>8</sup>	43 <sup>28</sup>	-10 <sup>16</sup>	60 <sup>20,26</sup>	13 <sup>1</sup>	77 <sup>28</sup>	15 <sup>4</sup>	85 <sup>18,20</sup>	32 <sup>1,3</sup>
7	Port Huron‡. . . . .	90	-5	95	48 <sup>20</sup>	-3 <sup>12</sup>	48 <sup>2</sup>	-5 <sup>19</sup>	74 <sup>19</sup>	18 <sup>1</sup>	80 <sup>29</sup>	20 <sup>5</sup>	86 <sup>18</sup>	26 <sup>1</sup>
8	Thornville§. . . . .	90	-8	98	47 <sup>20</sup>	-8 <sup>19</sup>	44 <sup>26</sup>	-8 <sup>17</sup>	76 <sup>19</sup>	15 <sup>1</sup>	79 <sup>29</sup>	13 <sup>5</sup>	85 <sup>20</sup>	26 <sup>1</sup>
9	Lansing, S. B. of H. §¶	92	-12	104	49 <sup>20</sup>	-6 <sup>11</sup>	46 <sup>2</sup>	-12 <sup>16</sup>	81 <sup>19</sup>	16 <sup>1</sup>	79 <sup>29</sup>	16 <sup>3</sup>	82 <sup>12,26</sup>	30 <sup>1</sup>
10	Ann Arbor.  . . . . .	92	-10	102	50 <sup>22</sup>	-7 <sup>12</sup>	48 <sup>2</sup>	-10 <sup>17</sup>	77 <sup>19</sup>	12 <sup>1</sup>	79 <sup>29</sup>	18 <sup>5</sup>	88 <sup>17</sup>	25 <sup>1</sup>
11	Detroit‡. . . . .	92	-5	97	53 <sup>20</sup>	-5 <sup>12</sup>	50 <sup>2</sup>	-4 <sup>18</sup>	73 <sup>19</sup>	19 <sup>1</sup>	79 <sup>29</sup>	22 <sup>4</sup>	87 <sup>17</sup>	28 <sup>1</sup>

\*The names of observers, etc., are stated in Table I.

†The line No. 1, and the three columns for the year 1903, relate to the ten stations from which observations were received for every month of the year.

‡At the stations of the U. S. Weather Bureau, the maximum thermometer was read and recorded at 8:00 A. M., and the minimum at 8:00 P. M., 75th Meridian time. The local time at these stations corresponding to 8:00 A. M. and 8:00 P. M., 75th Meridian time, is as follows: At Port Huron, 7:30 A. M. and 7:30 P. M.; at Detroit, 7:28 A. M. and 7:28 P. M.; at Alpena, 7:26 A. M. and 7:26 P. M.; at Marquette, 7:11 A. M. and 7:11 P. M.; at Sault Ste. Marie, 7:23 A. M. and 7:23 P. M.

§For stations marked thus §, the daily readings of registering thermometers were recorded at 7 A. M. for the preceding calendar day.

¶Beginning with the year 1885 allowance must be made for Lansing in Table XIV, because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit B, on page 22, report for 1886.

||At Ann Arbor, the registering thermometers were read at 9 P. M.

NOTE.—The small figures above and at the right of numbers denoting the degrees of temperature, state the day or days of the month on which the highest or lowest temperature occurred.

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*lowest temperature occurred by months of the year 1903; also, extremes and range for the year  
mometers, by observers\* for the State Board of Health, and for the United States Weather Bureau.*

June.		July.		August.		September.		October.		November.		December.		Line number.
Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	
87	38	94	45	87	41	89	31	79	23	74	4	41	-17	1
86 <sup>7</sup>	38 <sup>10</sup>	94 <sup>7</sup>	45 <sup>4</sup>	87 <sup>21</sup>	40 <sup>3</sup>	82 <sup>22</sup>	38 <sup>29</sup>	74 <sup>29</sup>	31 <sup>23</sup>	74 <sup>3</sup>	10 <sup>27</sup>	36 <sup>19</sup>	-12 <sup>3</sup>	2
81 <sup>30</sup>	40 <sup>11</sup>	87 <sup>8</sup>	45 <sup>8</sup>	79 <sup>17</sup>	46 <sup>7</sup>	77 <sup>9</sup>	34 <sup>29</sup>	66 <sup>8</sup>	29 <sup>23</sup>	62 <sup>4</sup>	2 <sup>26</sup>	34 <sup>20</sup>	-17 <sup>6</sup>	3
80 <sup>28</sup>	41 <sup>10</sup>	93 <sup>8</sup>	46 <sup>31</sup>	84 <sup>21</sup>	44 <sup>12</sup>	86 <sup>12</sup>	36 <sup>28</sup>	79 <sup>3</sup>	28 <sup>26</sup>	68 <sup>3</sup>	10 <sup>25</sup>	36 <sup>20, 21</sup>	-1 <sup>27</sup>	4
81 <sup>8</sup>	38 <sup>12</sup>	93 <sup>8</sup>	46 <sup>15</sup>	83 <sup>19</sup>	42 <sup>7</sup>	84 <sup>3</sup>	34 <sup>29</sup>	72 <sup>9</sup>	28 <sup>24</sup>	70 <sup>3</sup>	10 <sup>28</sup>	36 <sup>24</sup>	-9 <sup>26</sup>	5
80 <sup>30</sup>	40 <sup>11</sup>	94 <sup>8</sup>	46 <sup>14</sup>	85 <sup>18</sup>	41 <sup>6</sup>	83 <sup>3</sup>	31 <sup>28</sup>	72 <sup>9</sup>	28 <sup>26</sup>	74 <sup>3</sup>	10 <sup>25</sup>	38 <sup>24</sup>	-11 <sup>26</sup>	6
84 <sup>8</sup>	46 <sup>15</sup>	90 <sup>8</sup>	46 <sup>18</sup>	83 <sup>18</sup>	44 <sup>7</sup>	86 <sup>12</sup>	37 <sup>28</sup>	76 <sup>7</sup>	28 <sup>27</sup>	70 <sup>3</sup>	11 <sup>28</sup>	38 <sup>21</sup>	-3 <sup>26</sup>	7
83 <sup>29</sup>	45 <sup>1</sup>	90 <sup>9</sup>	48 <sup>16, 21</sup>	84 <sup>9</sup>	45 <sup>11, 14</sup>	85 <sup>14</sup>	37 <sup>29</sup>	74 <sup>1</sup>	24 <sup>27</sup>	69 <sup>3</sup>	13 <sup>28</sup>	39 <sup>21, 23</sup>	-5 <sup>26</sup>	8
86 <sup>29</sup>	43 <sup>16</sup>	92 <sup>8</sup>	45 <sup>14</sup>	86 <sup>24</sup>	44 <sup>6</sup>	87 <sup>12</sup>	36 <sup>27</sup>	79 <sup>3</sup>	23 <sup>26</sup>	70 <sup>4</sup>	7 <sup>19</sup>	41 <sup>28</sup>	-2 <sup>23</sup>	9
87 <sup>30</sup>	43 <sup>15</sup>	92 <sup>8</sup>	45 <sup>18</sup>	86 <sup>18</sup>	45 <sup>7</sup>	89 <sup>1</sup>	35 <sup>28</sup>	78 <sup>3</sup>	23 <sup>24</sup>	73 <sup>3</sup>	10 <sup>28</sup>	40 <sup>23</sup>	-2 <sup>24</sup>	10
86 <sup>30</sup>	47 <sup>12</sup>	92 <sup>8</sup>	50 <sup>16</sup>	84 <sup>6</sup>	47 <sup>7</sup>	88 <sup>15</sup>	41 <sup>15</sup>	75 <sup>7</sup>	28 <sup>27</sup>	71 <sup>3</sup>	13 <sup>26</sup>	39 <sup>23</sup>	1 <sup>14</sup>	11

TABLE XV.—Average daily range of temperature, by registering thermometers for the year and by months of the year 1903, at each of 11 stations in Michigan, and also an average line for the 11 stations.

Stations in Michigan.* (Those of the U. S. Weather Bureau in italics.)	Divisions of the State.†	Nor- mal.‡	Average daily range of temperature.—Degrees Fahr.												
			Year 1903.	Months, 1903.											
				Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 11 stations§.....			16.82	13.42	15.67	15.17	17.28	20.75	17.90	19.52	16.50	19.47	18.32	14.46	13.36
<i>Marquette</i> .....	U. P.	14.51 <sup>18</sup>	*12.83	11.40	13.50	10.40	9.60	14.80	14.20	16.20	10.60	15.40	15.60	11.50	10.70
<i>Sault Ste. Marie</i> .....	U. P.	16.85 <sup>12</sup>	15.82	14.50 <sup>a</sup>	16.80	12.20	15.50	21.40	20.40	15.70	14.30	16.60	16.70	12.30	13.40
Traverse City.....	N. W.	19.44 <sup>22</sup>	17.56	12.41	16.71	17.81	18.10	21.16	16.63	21.06	17.55	19.07	20.74	15.17	14.29
<i>Alpena</i> .....	N. E.	15.54 <sup>24</sup>	15.83	12.00	16.00	14.00	15.00	17.00	18.00	18.00	17.00	18.00	18.00	14.00	13.00
Harrisville.....	N. E.	19.66 <sup>19</sup>	17.93	17.23	18.79	14.74	17.33	16.29	16.33	18.74	17.23	20.80	21.48	18.00	18.23
<i>Port Huron</i> .....	B. & E.	15.87 <sup>24</sup>	15.73	13.20	13.50	14.30	16.20	19.70	15.70	18.60	15.40	19.70	16.50	13.90	12.10
<sup>b</sup> Thornville.....	B. & E.	20.57 <sup>24</sup>	15.33	10.32	13.04	12.68	16.47 <sup>b</sup>	21.32	17.97	19.06 <sup>c</sup>	15.58	18.77	15.90	12.40	10.42
Agricultural College. .	C.	21.04 <sup>22</sup>	20.01	16.61	20.22 <sup>b</sup>	17.93 <sup>a</sup>	22.17 <sup>d</sup>	26.90	22.37 <sup>e</sup>	25.32 <sup>e</sup>	19.84	20.97	18.78	14.44	14.62
Lansing S. B. of H. ....	C.	19.33 <sup>25</sup>	19.06	14.19	16.86	18.84	20.40	23.23	19.73	21.94	19.39	21.83	21.03	16.97	14.32
Ann Arbor.....	S. C.	18.77 <sup>22</sup>	19.89	14.20	15.20	19.30	22.30	27.10	20.40	22.30	19.80	25.20	21.00	17.30	14.60
<i>Detroit</i> .....	S. E.	15.42 <sup>25</sup>	15.03	11.60	11.80	14.70	17.00	19.40	15.20	17.80	14.80	17.80	15.80	13.10	11.30

\* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Table I.

† The counties in each division are stated in Exhibit I, in the annual report for 1898.

‡ Numbers in this column state the annual average range of temperature for periods of years ending in each case with December 31, 1903. The small figures above and at the right of numbers which state the range of temperature, denote the number of years included in the average.

§ This line is an average for the 11 stations for which statements nearly complete are given for every month of the year.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, stand directly above the numbers from which they refer to the notes below.

a For 29 days. b For 27 days. c For 20 days. d For 18 days. e For 16 days.

Graphic representations of statements in Table XV are given in Diagram II.



TABLE XVI.—*Comparisons of the extremes and the range of temperature (degrees Fahr.) during the year, and during each month of the year 1903, with the average of the extremes, and of the range, for the 26 years, 1877-1902, also statement of the extremes and of the range for each of the seven years, 1897-1903. Observations made with registering thermometers by observers for the State Board of Health, and for the U.S. Weather Bureau. These comparisons, etc., are for groups of several stations in Michigan.*

Year and months.	Extremes and ranges of temperature.—Degrees Fahrenheit.																				
	1897.			1898.			1899.			1900.			1901.			1902.			Av. for 26 years, 1877-1902.		
	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.
Year.....	102	-21	123	100	-18	118	104	-37	141	103	-22	125	108	-18	126	94	-14	108	100	-25	125
Av. mo.,	78	10	68	79	13	66	83	10	73	79	15	64	78	15	63	74	16	58	79	11	68
Jan.....	58	-19	77	58	-10	68	51	-28	79	54	-14	68	54	-17	71	44	-14	58	53	-20	73
Feb.....	46	-21	67	57	-18	75	60	-37	97	63	-22	85	41	-12	53	57	-10	67	55	21	76
March....	70	-14	84	70	-3	73	66	-13	79	49	-12	61	70	-18	88	70	-6	76	66	-13	79
April.....	79	5	74	78	8	70	91	5	86	83	18	65	84	19	65	84	13	71	83	9	74
May.....	84	22	62	83	23	54	93	27	66	92	24	68	85	31	54	90	21	69	90	24	66
June.....	92	27	65	96	33	57	97	37	60	99	35	64	99	34	65	88	35	53	95	33	62
July.....	102	46	56	99	37	62	104	42	62	98	42	56	108	47	61	94	45	49	99	41	58
Aug.....	94	38	56	100	42	58	104	42	62	103	46	57	94	44	50	89	41	48	97	38	59
Sept.....	98	28	70	98	32	63	103	21	82	95	36	59	93	33	60	85	36	49	94	29	65
Oct.....	91	25	66	89	16	73	85	21	64	89	25	64	81	22	59	75	25	50	84	20	64
Nov.....	65	-5	70	67	3	64	84	19	65	69	10	59	63	7	56	70	14	56	69	2	67
Dec.....	57	-16	73	51	-17	68	59	-17	76	54	-7	61	59	-10	69	47	-5	52	57	-11	68

\* For the twenty-seven years, 1877-1903, the highest temperature was 108° at Marquette, July 15, 1901; the lowest was -37°, at Sault Ste. Marie, February 10, 1899.

TABLE XVII.—Average absolute humidity, by year and months in 1903, compared with annual and monthly averages for 1902, and for the 26 years, 1877-1902\*. These averages are for groups of several stations in Michigan.

Years, etc.	Absolute humidity.—Grains of vapor in a cubic foot of air.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 26 years, 1877-1902..	3.48	1.45	1.47	1.83	2.85	4.03	5.52	6.14	5.82	4.94	3.56	2.36	1.76
1902 (5 stations).....	3.44	1.33	1.26	2.24	2.68	4.19	4.92	6.58	5.48	4.67	3.41	2.98	1.53
1903 (4 stations).....	3.38	1.35	1.40	2.49	2.76	4.27	4.87	6.15	5.57	4.95	3.50	2.06	1.24
In 1903 <b>greater</b> than av. for 26 years, 1877- 1902.....				.66		.24		.01		.01			
In 1903 <b>less</b> than av. for 26 years, 1877-1902 ..	.10	.10	.07		.09		.65		.25		.06	.30	.52
In 1903 <b>greater</b> than in 1902.....		.02	.14	.25	.08	.08			.09	.28	.09		
In 1903 <b>less</b> than in 1902	.06						.05	.43				.92	.29

\* At from 5 to 23 stations per year for the 26 years, 1877-1902. Just which stations in each year, up to 1897, are shown on page 27, report for 1898.

NOTE.—Beginning with the year 1885, allowance must be made for Lansing in Table XVII., because of a change in the location of the instruments. The amount of variation by months is shown in Exhibit C, on page 23, report for 1886.

TABLE XVIII.—Average relative humidity, by years and months, in 1903, compared with annual and monthly averages for 1902, and for the 25 years, 1878-1902.\* These averages are for groups of several stations in Michigan.

Years, etc.	Per cent of saturation.—Relative humidity.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 25 years, 1878-1902..	77	83	82	79	71	71	73	72	74	76	77	80	83
1902 (6 stations).....	79	81	80	78	72	75	79	81	78	80	77	80	83
1903 (3 stations).....	77	84	83	79	71	68	76	73	79	76	74	79	87
In 1903 greater than av. for 25 years, 1878- 1902.....		1	1				3	1	5				4
In 1903 less than av. for 25 years, 1878-1902 ..						3					3	1	
In 1903 greater than in 1902.....		3	3	1					1				4
In 1903 less than in 1902	2				1	7	3	8		4	3	1	

\*At from six to 22 stations per year for the 25 years, 1878-1902. Just which stations in each year up to 1897, are shown on page 28, report for 1898.

NOTE.—Beginning with the year 1885, allowance must be made for Lansing in Table XVIII., because of a change in the location of instruments. The amount of the variation is shown in Exhibit D, on page 23, report for 1886.

DIAGRAM III.—ABSOLUTE HUMIDITY, BY MONTHS, 1903.

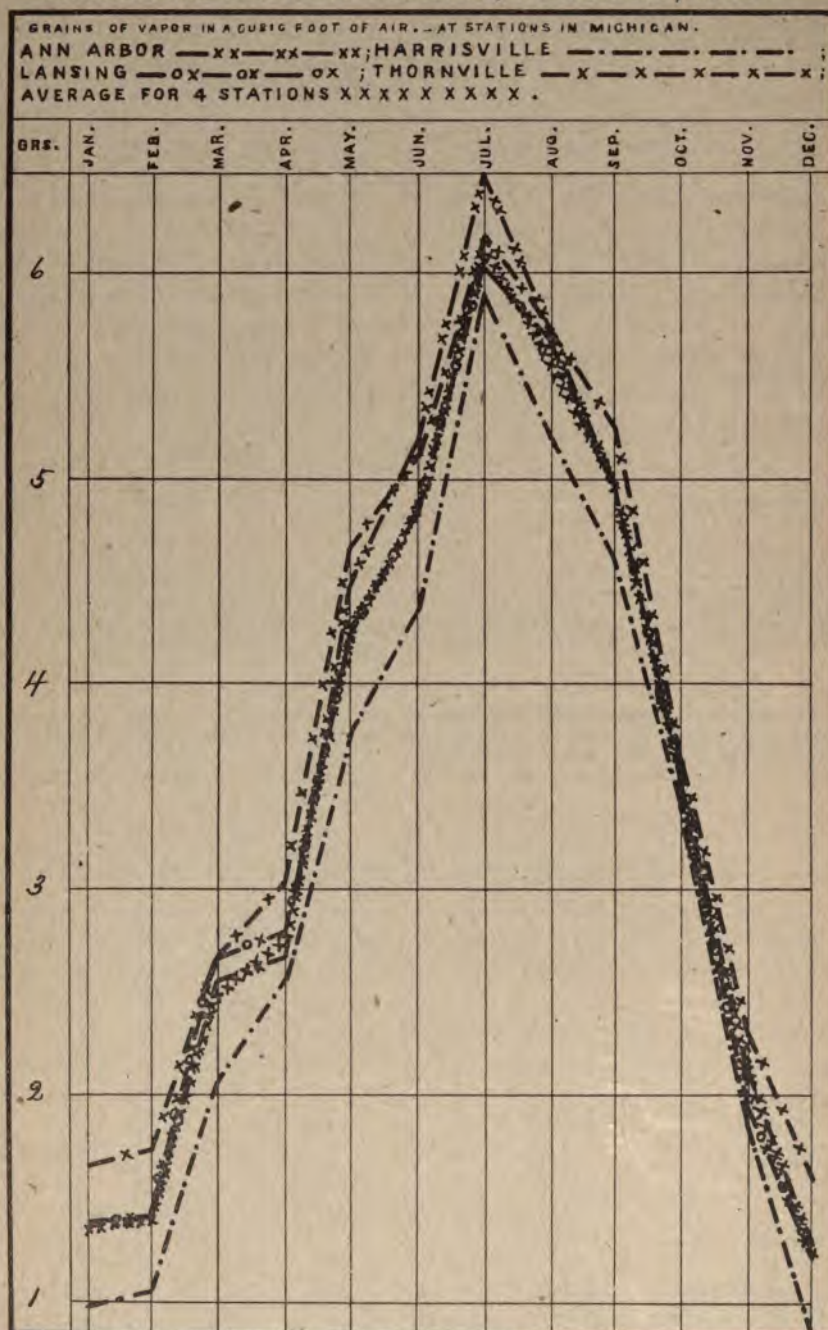


TABLE XIX.—ABSOLUTE HUMIDITY.—*The average number of grains of vapor of water in a cubic foot of air for months and year 1903, at 6 stations in Michigan; also average line for 4 stations.—Average of observations made daily at 7 A. M., 2 P. M. and 9 P. M., by observers\* for the State Board of Health.*

Stations in Michigan.*	Divisions of the State.†	Grains of vapor in a cubic foot of air.—(Absolute humidity.)‡													
		Year.		Months, 1903.											
		Norm. §	1903.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 4 stations¶.....			3.38	1.35	1.40	2.49	2.76	4.27	4.87	6.15	5.57	4.95	3.50	2.06	1.24
Traverse City.. . . .	N. W.		**	d	e		i	g			h				
Harrisville.....	N. E.	3.11 <sup>9</sup>	3.05	.98	1.05	2.06	2.54	3.76	4.35	5.89	5.20	4.61	3.40	1.87	.85
Thornville.....	B. & E.	3.66 <sup>27</sup>	3.62	1.66	1.73	2.67	3.03	4.64	5.11	6.18	5.71	5.25	3.61	2.29	1.60
Agricultural College..	C.		††				f	a	j					c	
Lansing, S. B. of H.‡...	C.	3.40 <sup>25</sup>	3.39	1.38	1.42	2.67	2.80	4.24	4.84	6.05	5.67	4.96	3.49	1.95	1.22
Ann Arbor.....	S. C.	3.56 <sup>4</sup>	3.48	1.36	1.41	2.55	2.67	4.45	5.18	6.47	5.71	4.98	3.51	2.12	1.29

\* The names of the observers, their places of observation, and the counties in which these places are situated, are stated in Table I.

† The full names of the divisions and the counties in each division are stated in Exhibit I, in the annual report for 1898 and in preceding reports.

‡ The number of grains of vapor in a cubic foot of air at each observation was determined from readings of the psychrometer by means of Glaisher's table, Table XII. of the Smithsonian Meteorological and Physical Tables (1859).

§ Numbers in this column state the average annual absolute humidity for periods of years ending in each case with December 31, 1903. The small figures above and at the right of numbers which state the absolute humidity denote the number of years included in the average.

¶ This line is an average for the 4 stations from which statements complete, or nearly complete were received for every month of the year. It does not include the lines for Traverse City and Agricultural College.

‡ Beginning with the year 1885, allowance must be made for Lansing in Table XIX. because of a change in the location of the instruments. The amount of variation by months is shown in Exhibit C, page 23, report for 1886.

\*\* The average for 11 months is 3.16.

†† The average for 8 months is 4.96.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 92 observations.

b For 89 observations.

c For 87 observations.

d For 85 observations.

e For 83 observations.

f For 81 observations.

g For 80 observations.

h For 74 observations.

i For 68 observations.

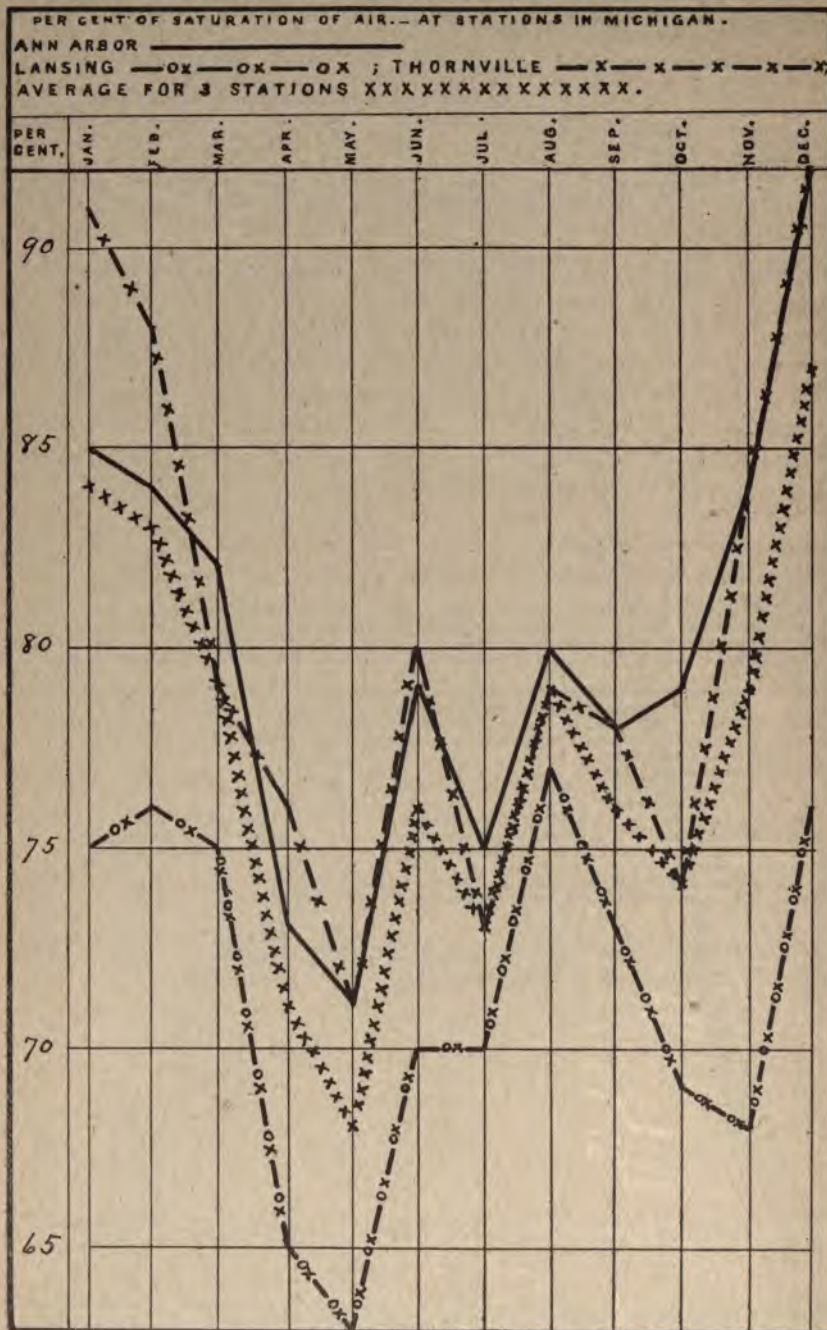
j For 49 observations.

NOTE.—The computations of absolute humidity at Ann Arbor for each month in 1903 were furnished by the observer there. All other computations in Table XIX. were made at the office of the Secretary of the State Board of Health.

The "average" line and the lines for four stations in Table XIX. are graphically represented in Diagram III.



DIAGRAM IV.—RELATIVE HUMIDITY, BY MONTHS, 1903.



[PLATE 1204]



TABLE XX.—RELATIVE HUMIDITY.—Average per cent of saturation of the atmosphere with vapor of water for months and year 1903, at 6 stations in Michigan; also average line for 3 stations. Average of observations made daily at 7 A. M., 2 P. M. and 9 P. M. by observers\* for the State Board of Health.

Stations in Michigan.*	Divisions of the State.†	Per cent of saturation.—Relative humidity.													
		Year.	Months, 1903.												
			Norm. ‡	1903.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
Av. for 3 stations§.....			77	84	83	79	71	68	76	73	79	76	74	79	87
Traverse City.....	N. W.		¶ 87 <sup>c</sup>	83 <sup>d</sup>	84	77 <sup>h</sup>	75 <sup>f</sup>	78	81 <sup>g</sup>	79	79	79	86	95 <sup>a</sup>	
Harrisville.....	N. E.		72	61	59	74	75	78	76	79	79	79	73	68	59 <sup>n</sup>
Thornville.....	B. & E.	78 <sup>26</sup>	80	91	88	79	76 <sup>a</sup>	71 <sup>i</sup>	80	73	79	78	74	84 <sup>b</sup>	92
Agricultural College....	C.	**					87 <sup>e</sup>	87	88	88	94	92	87	92	.....
Lansing, S. B. of H.¶	C.	72 <sup>25</sup>	71	75	76	75	65	63	70	70	77	73	69	68	76
Ann Arbor.....	S. C.	79 <sup>4</sup>	80	85	84	82	73	71	79	75	80	78	79	84	92

\* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Table I.

† The full names of the divisions and the counties in each division are stated in Exhibit I, in the annual report for 1898 and in preceding reports.

‡ Numbers in this column state the average annual relative humidity for periods of years ending in each case with December 31, 1903. The small figures above and at the right of the numbers which state the relative humidity, denote the number of years included in the average.

¶ The average for 11 months is 83.

§ This line is an average for the 3 stations from which statements complete, or nearly complete were received for every month in the year. It does not include the line for Traverse City, Harrisville and the Agricultural College.

|| Beginning with the year 1885, allowance must be made for Lansing in Table XX, because of a change in location of the instruments. The amount of the variation by months is shown in Exhibit D, on page 23, report for 1886.

\*\* The average for 8 months is 89.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 92 observations.

b For 88 observations.

c For 85 observations.

d For 83 observations.

e For 82 observations.

f For 80 observations.

g For 74 observations.

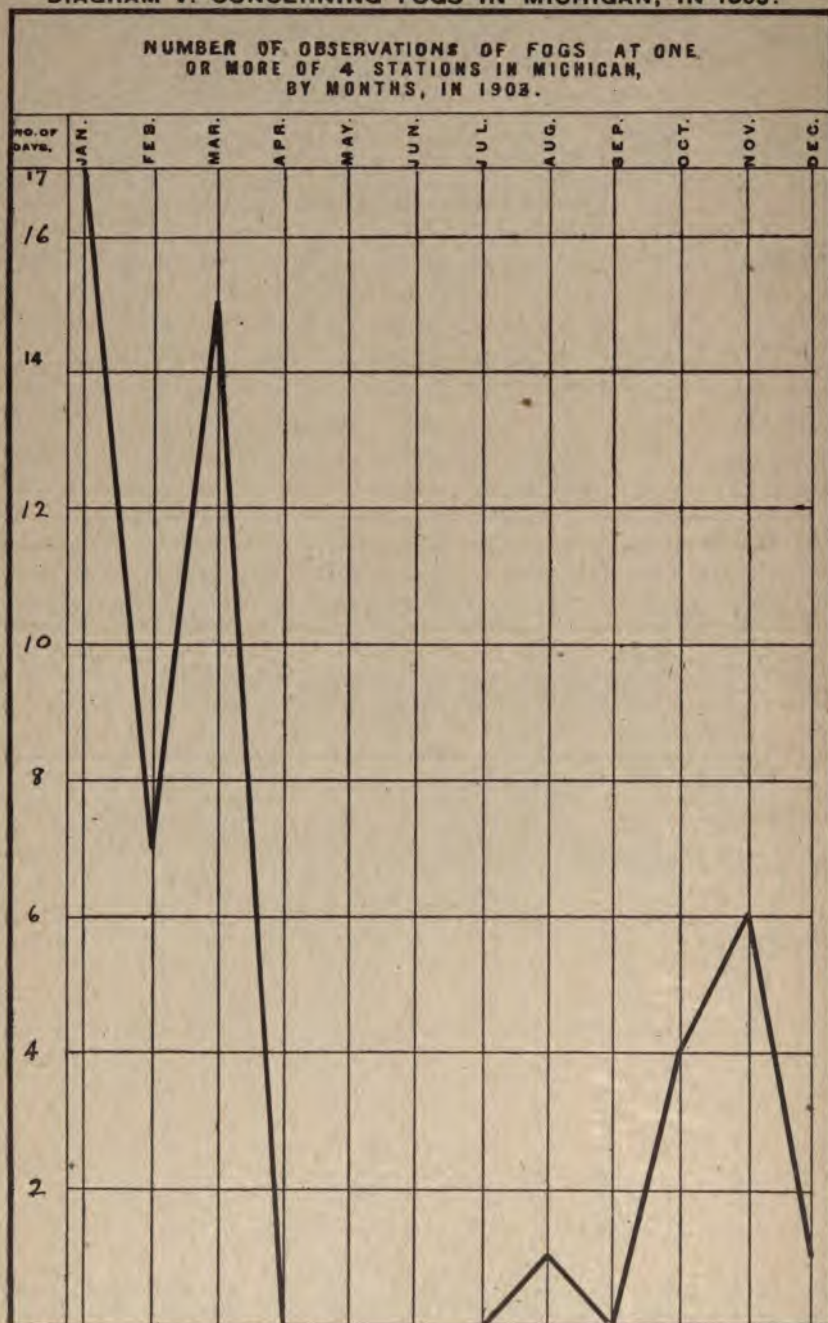
h For 67 observations.

i For 49 observations.

NOTE.—The observations in Table XX were reduced by Guyot's table, in Smithsonian Meteorological Tables, or by a table substantially the same as that. Computations for Ann Arbor in 1903 were made by the observers there. All other computations in Table XX were made at the office of the State Board of Health.

Graphic representations of four representative lines in Table XX are given in Diagram IV.

DIAGRAM V.—CONCERNING FOGS IN MICHIGAN, IN 1903.



[PLATE 1205.]

*Fogs.*—For the year 1903, fog was reported at 29 morning observations, at 7 afternoon observations (at about 2 P. M.), at 15 evening observations (at about 9 P. M.), and at one time during the day, no special time being mentioned, in many cases the same fog, or fog at the same time, being reported by different observers. Fog was reported, at one or more stations at some time during the day, on 24 days.

TABLE XXI.—*Number of different days on which fog was observed at one or more of 4 stations in Michigan\* in 1903, and each month of the year 1903.*

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
24	3	4	8	0	0	0	0	1	0	2	5	1

\* This exhibit contains statements only for those localities from which reports were received for every month of the year, as follows: Traverse City, Thornville, Lansing, and Ann Arbor.

Table XXI, "Number of different days on which fog was observed," etc., supplies knowledge of the *time*, in each month, on which fog was observed somewhere in Michigan. Table XXII, "Number of observations at which fog was observed," etc., supplies knowledge of the *time* combined with the *area* of the occurrences of fog. For the State as a whole, therefore, the last mentioned exhibit supplies the most important information. Therefore, in this report the diagram relative to fog is made to exhibit the facts contained in this last-mentioned table. Heretofore it has represented the "Number of different days on which fog was observed at one or more stations in Michigan."

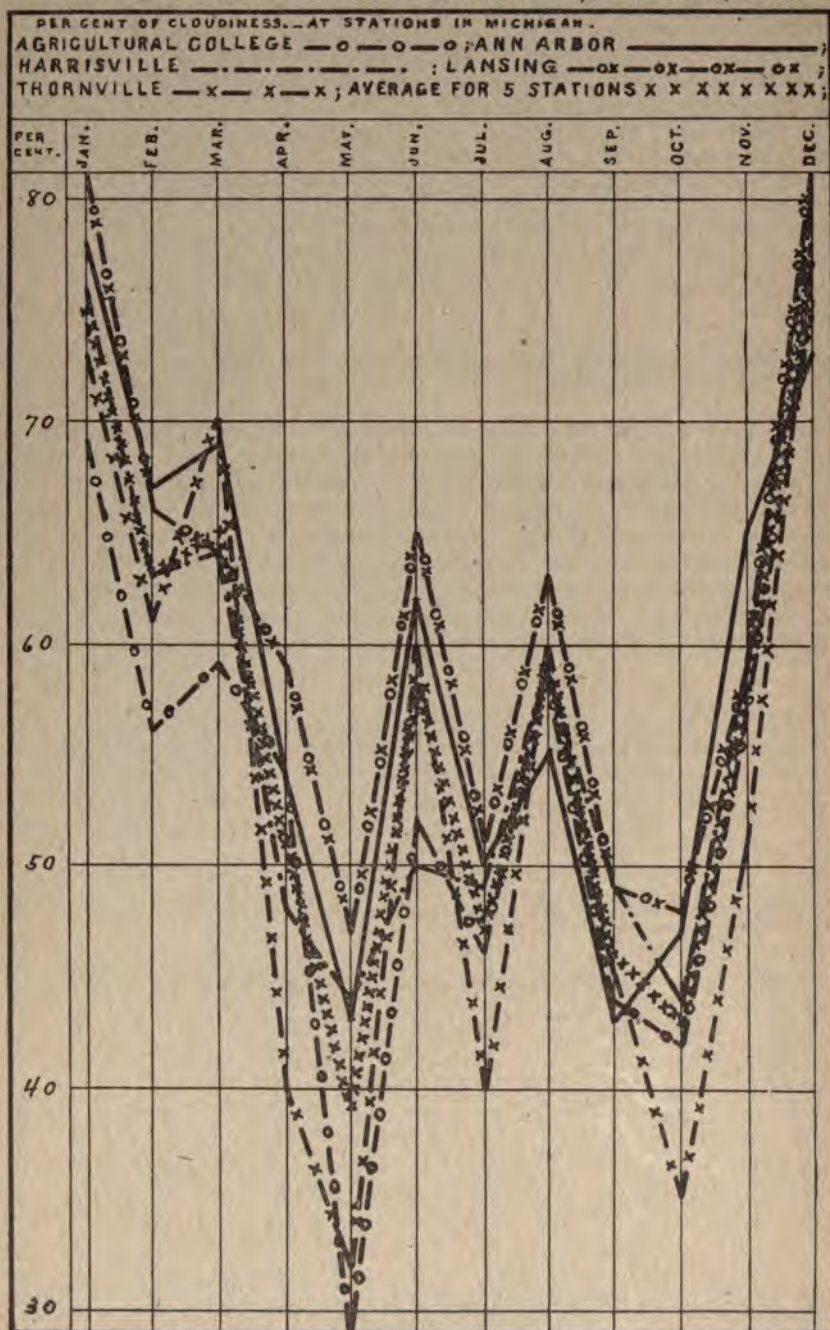
TABLE XXII.—*Number of observations at which fog was observed in Michigan in 1903, and in each month of the year 1903. (Observations taken three times daily, at 4 stations.)\**

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
51	17	7	15	0	0	0	0	1	0	4	6	1

\* This exhibit contains statements only for those localities from which registers were received for every month of the year; the localities are stated in a foot-note to Table XXI, above.

Graphic representations of statements in Table XXII are given in Diagram V.

DIAGRAM VI.—AV. PER CENT OF CLOUDINESS, BY MONTHS, 1903.



[PLATE 1206.]

TABLE XXIII.—Average per cent of cloudiness for months and year 1903, at 6 stations in Michigan; also average line for 5 stations. Average of observations made daily at 7 A. M., 2 P. M., and 9 P. M., by observers\* for the State Board of Health.

Stations in Michigan.*	Divisions of the State.†	Average per cent of cloudiness.													
		Year.	Months, 1903.												
			Norm. ‡	1903.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
Av. for 5 stations§.....			57	75	63	65	51	39	58	47	59	46	43	58	77
Traverse City.....	N. W.	<sup>d</sup> 84	70	63	66	56	44	.....	<sup>f</sup> 58	63	40	76	89		
Harrisville.....	N. E.	<sup>9</sup> 62	57	76	63	64	48	44	50	49	59	49	44	59	80
Thornville.....	B. & E.	<sup>27</sup> 51	54	73	61	70	40	32	60	40	60	45	35	51	78
Agricultural College.....	C.	<sup>40</sup> 56	54	69	56	59	<sup>c</sup> 54	<sup>a</sup> 29	<sup>g</sup> 52	46	<sup>a</sup> 59	44	<sup>a</sup> 42	<sup>b</sup> 57	75
Lansing, S. B. of H.....	C.	<sup>25</sup> 58	61	81	66	64	59	47	65	51	63	49	48	59	81
Ann Arbor.....	S. C.	<sup>24</sup> 56	59	78	67	69	54	43	62	50	55	43	47	65	73

\* The names of the observers, their places of observation, and the counties in which these places are situated, are stated in Table I.

† The full names of divisions and the counties in each division are stated in Exhibit I, in the annual report for 1898 and preceding reports.

‡ Numbers in this column state the average per cent of cloudiness for periods of years ending in each case with December 31, 1903. The small figures above and at the right of numbers which state the per cent of cloudiness, denote the number of years included in the average.

§ This line is an average for all the stations from which statements, complete, or nearly complete, were received for every month of the year. It does not include Traverse City.

¶ The average for 11 months is 64.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 92 observations.

b For 89 observations.

c For 88 observations.

d For 87 observations.

e For 82 observations.

f For 75 observations.

g For 72 observations.

Graphic representations of six representative lines in Table XXIII are given in Diagram VI.

*Diagrams relating to meteorological conditions.*—Most of the diagrams in this paper are to be read by tracing each irregular line across the diagram from left to right, and noting at what point it intersects each of the perpendicular lines having the name of the month at the top. What station is represented by the irregular line may be learned from the head of the diagram. The degree of value denoted by the intersection may be learned by referring to the figures in the left hand column. Thus in Diagram I, relating to average temperature in 1903, tracing the line “— · —” representing Harrisville, it may be seen that the average temperature at Harrisville was, in March, about 35°, in April about 40°, in August about 62°, etc. Definite numerical statements of the average temperature for each month at each station may be found in Table IX, and accompanying each diagram is a table giving exact numerical statements for the conditions represented. The average lines given in each table are represented in the corresponding diagram by an X line, thus X X X X. The lines in the diagrams give more ready general comparisons of stations with each other, or of months, with each other, than is possible from the mere numerical statements. By diagram II, it appears at a glance that the average daily range of temperature at Ann Arbor in 1903 was, during May, greater than at any other of the eleven stations represented



in that diagram, and during April was less at Marquette. The marked agreement in the course of lines in Diagram I, representing mean monthly temperature at six stations, and also that the agreement is closer in November and December than in the other months, appear at once on reference to the diagram. The resemblance between the lines in Diagram I, relating to mean temperature by months in 1903, and those in Diagram III, relating to absolute humidity of the atmosphere for the same periods, is apparent. By Diagram X, it appears that in every month of the year the highest velocity of the wind (on an average for the month) is reached between 12 M. and 2 P. M., and that the lowest velocity occurs in the latter part of the night or in early

TABLE XXIV.—Average per cent of cloudiness, by year and months, in 1903, compared with annual and monthly averages for 1902, and for 26 years, 1877-1902.\* These averages are for groups of several stations in Michigan.

Years, etc.	Per cent of cloudiness.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 26 years, 1877-1902	56	71	64	58	52	51	46	40	42	45	55	69	74
1902 (6 stations).....	58	67	55	51	57	52	59	52	41	59	56	68	78
1903 (5 stations).....	57	75	63	65	51	39	58	47	59	46	43	58	77
In 1903 <b>greater</b> than av. for 26 years, 1877-1902.	1	4		7			12	7	17	1			3
In 1903 <b>less</b> than av. for 26 years, 1877-1902			1		1	12					12	11	
In 1903 <b>greater</b> than in 1902. ....		8	8	14					18				
In 1903 <b>less</b> than in 1902.	1				6	13	1	5		13	13	10	1

\* At from 6 to 23 stations per year for the twenty-six years, 1877-1902. Just which stations in each year, up to 1897, are shown on page 48, report for 1898.

TABLE XXV.—Dates of solar and lunar

Line number.	Stations.	Dates of halos recorded,									
		January.		February.		March.		April.		May.	
		Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.
1	Port Huron.....		10								
2	Lansing.....	26, 31	10	24	9		9	5	5		5

Paraselenes: December 28.—Lansing.

Diagrams XII, XIII, XIV, and XV, relating to the direction of the wind, are constructed on a plan different from that of the other diagrams. A description of the plan of their construction, method of reading, etc., is printed on page 62 of the annual report for 1898, and in preceding reports.

Years, etc.	Inches of rain and melted snow.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 26 years, 1877-1902..	33.76	2.18	2.23	2.28	2.38	3.47	3.58	3.19	2.90	3.07	3.02	2.97	2.49
1902 (12 stations)....	34.34	.82	.92	2.49	1.73	3.75	5.15	6.16	1.66	4.42	2.52	2.40	2.32
1903 (10 stations).....	35.73	1.61	2.56	2.11	3.07	2.89	3.55	4.71	4.93	3.46	2.16	2.37	2.33
In 1903 <b>greater</b> than av. for 26 years, 1877-1902.	1.97	.....	.33	.....	.69	.....	.....	1.52	2.03	.39	.....	.....	.....
In 1903 <b>less</b> than av. for 26 years, 1877-1902	.....	.57	.....	.17	.....	.58	.03	.....	.....	.....	.86	.60	.16
In 1903 <b>greater</b> than in 1902. ....	1.39	.79	1.64	.....	1.34	.....	.....	.....	3.27	.....	.....	.....	.01
In 1903 <b>less</b> than in 1902.	.....	.....	.....	.38	.....	.86	1.60	1.45	.....	.96	.36	.03	.....

*halos recorded on monthly registers in 1903.*

months, 1903.														Line number.
June.		July.		August.		September.		October.		November.		December.		
Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	4	7	27	.....	28	2



**TABLE XXVII.**—*Inches of rain and melted snow for months and year 1903, at 11 stations in Michigan; also average line for 10 stations,—as compiled from daily observations made by observers\* for the State Board of Health, and for the U. S. Weather Bureau.*

Stations <sup>1</sup> in Michigan.* (Those of the U. S. Weather Bureau in italics.)	Divisions of the State.†	Inches of rain and melted snow.													
		Year.	Months, 1903.												
			Norm. ‡	1903.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
Av. for 10 stations§....			35.73	1.61	2.56	2.11	3.07	2.89	3.55	4.71	4.93	3.46	2.16	2.37	2.33
<i>Marquette</i> .....	U. P.	32.18 <sup>18</sup>	39.30	1.35	.70	2.44	3.60	5.24	2.16	6.79	4.68	2.93	2.30	4.63	2.48
<i>Sault Ste. Marie</i> .....	U. P.	31.79 <sup>12</sup>	29.04	1.46	1.02	3.01	1.19	2.61	1.49	4.66	3.37	3.31	3.49	1.69	1.74
Traverse City. . . . .	N. W.	36.05 <sup>22</sup>	36.82	2.41	2.76	3.98	2.77	2.75	2.91	2.52	3.28	3.82	1.80	4.90	2.92
<i>Alpena</i> .....	N. E.	33.71 <sup>31</sup>	31.54	1.52	2.63	1.51	2.00	2.39	2.57	5.06	5.68	3.02	2.73	1.36	1.07
Harrisville.....	N. E.	33.63 <sup>17</sup>	37.71	1.96	2.88	1.84	2.19	2.95	3.32	5.52	5.47	4.89	2.27	1.76	2.66
<i>Port Huron</i> .....	B. & E.	31.23 <sup>29</sup>	32.91	1.38	2.46	1.54	2.13	3.68	2.47	4.89	4.26	3.23	2.16	2.78	1.87
Thorouville.....	B. & E.	32.50 <sup>27</sup>	41.83	1.63	3.63	2.06	2.66	3.41	4.95	3.63	7.18	4.39	1.67	2.32	4.30
Agricultural College.	C.	.....	¶	1.20	1.57	1.25	.....	2.63	6.28	3.79	6.73	2.86	2.01	1.46	1.84
Lansing, S. B. of H....	C.	33.18 <sup>24</sup>	36.68	1.54	3.10	1.52	4.40	2.07	4.16	4.79	5.68	3.92	1.99	1.45	2.06
Ann Arbor.....	S. C.	30.52 <sup>16</sup>	35.63	1.19	3.23	1.79	4.19	2.23	5.13	4.65	5.45	2.33	1.47	1.58	2.39
<i>Detroit</i> .....	S. E.	32.51 <sup>29</sup>	35.88	1.63	3.19	1.36	5.51	1.55	6.32	4.59	4.27	2.78	1.67	1.18	1.83

\* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Table I.

† The names of divisions, and the counties in each, are stated in Exhibit I, in the annual report for 1903 and preceding reports.

‡ Numbers in this column state the average annual rainfall for periods of years ending in each case with December 31, 1903. The small figures above and at the right of numbers which state the rainfall denote the number of years included in the average.

§ This line is an average for all the stations, from which statements are given for every month of the year. It does not include the line for the Agricultural College.

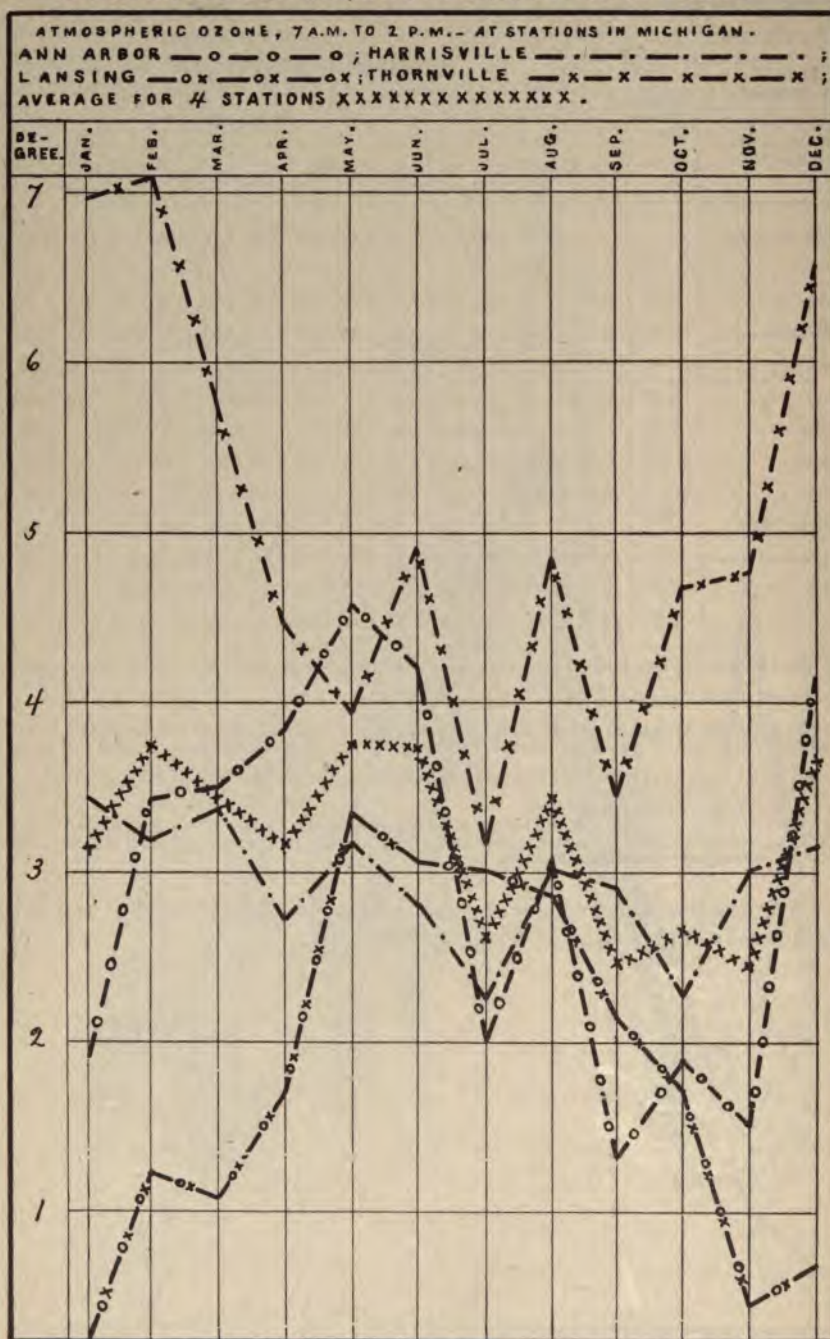
¶ The total rainfall for 11 months is 31.62 inches.

Norm.—The computations of amount of rainfall were furnished by the observers at Detroit, Alpena, Port Huron, Ann Arbor, Sault Ste. Marie, Marquette, and the Agricultural College for the year. All other computations in Table XXVII were made in the office of the Secretary of the State Board of Health.

The average line and lines for ten representative stations in Table XXVII are graphically represented in Diagram VII.



DIAGRAM VIII.—OZONE, AV. BY DAY, MONTHS IN 1903.



[ PLATE 1208. ]



TABLE XXVIII.—*Relative amount of ozone in the atmosphere by day, for months and year 1903, at 5 stations, also average line for 4 stations in Michigan, as indicated by averages of observations made daily by exposing test-paper prepared according to Schonbein's formula, from 7 A. M., to 2 P. M.—Recorded according to a scale of 10 degrees of coloration of the test-paper (greatest coloration by ozone equals 10) by observers for the State Board of Health.\**

Stations in Michigan.*	Divisions of the State.*	Degrees of coloration of test-paper.—Day observations.†													
		Year.		Months, 1903.											
		Norm. ‡	1903.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 4 stations§.....			3.18	3.14	3.73	3.43	3.17	3.76	3.74	2.61	3.44	2.45	2.64	2.43	3.64
Traverse City.....	N. W.		¶	b 6.06	6.08	6.44	e 6.33	c 6.74	6.64		d 6.76	5.71	5.98	5.85	5.89
Harrisville.....	N. E.	<sup>19</sup> 3.39	2.94	3.44	3.18	3.37	2.70	3.18	2.80	2.24	3.02	2.91	2.27	3.01	3.15
Thornville.....	B. & E.	<sup>27</sup> 3.42	5.04	6.96	7.08	5.76	4.44	3.93	4.90	3.17	4.82	3.44	4.66	4.75	6.56
Lansing, S. B. of H.....	C.	<sup>25</sup> 2.84	1.79	0.25	1.22	1.08	1.70	3.35	3.07	3.01	2.85	2.14	1.72	0.45	0.69
Ann Arbor.....	S. C.	<sup>11</sup> 2.81	2.95	1.89	3.43	3.50	3.84	4.57	4.20	2.01	3.08	<sup>a</sup> 1.31	1.89	1.51	4.15

\* The names of observers, their places of observation and the counties in which these places are situated, are stated in Table I. The full names of the division and counties in each division are stated in Exhibit I, in the annual report for 1898 and preceding reports.

† Allowance made for difference in sensitiveness of test-paper; explained below. "i"

‡ Numbers in this column state the average annual relative amount of ozone by day for periods of years ending in each case with December 31, 1903. The small figures above and at the right of numbers which state the average denote the number of years included in the average.

§ This line is an average for only the stations from which statements complete, or nearly complete, were received for every month in the year. It does not include the line for Traverse City.

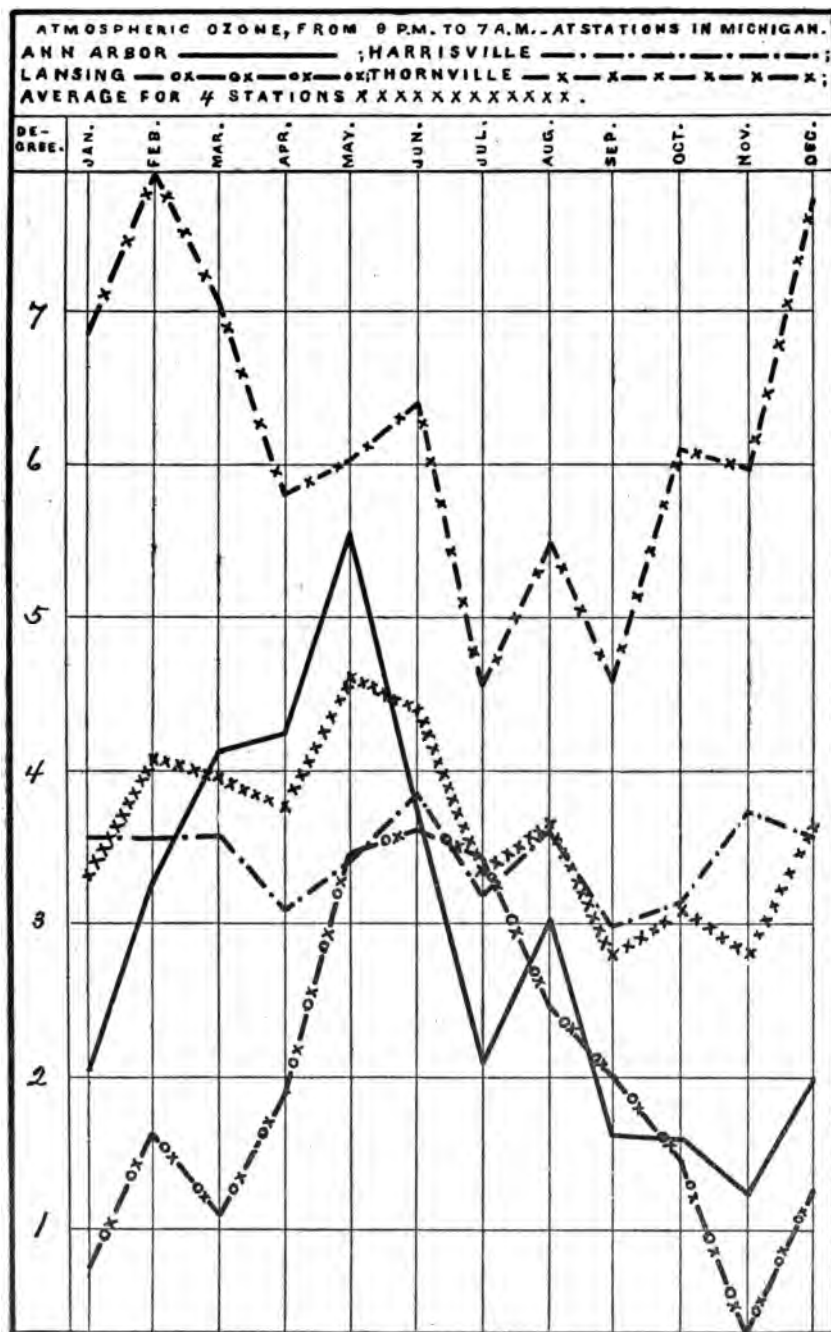
¶ The average for 11 months is 6.23.

a, b, c. In the columns from January to December, inclusive, the letters, a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 29 days. b For 28 days. c For 26 days. d For 25 days. e For 23 days. "i" Concerning Ozone Corrections.—It is now believed that the correction (for variation in sensitiveness of different lots of test-paper) applied to the monthly averages in the tables for the day and the night ozone, for the month of November in each of the years 1891, 1892 and 1893, at stations in Michigan and at Lansing was .39 too great for the day (7 A. M. to 2 P. M.) and .54 for the night ozone (9 P. M. to 7 A. M.). This should be taken into consideration in studying the tables relative to ozone in the annual reports of this board for those years.

Five lines in this table are represented in Diagram VIII.

ATMOSPHERIC OZONE, FROM 8 P.M. TO 7 A.M., AT STATIONS IN MICHIGAN.  
 ANN ARBOR \_\_\_\_\_; HARRISVILLE \_\_\_\_\_;  
 LANSING - OX - OX - OX; THORNVILLE - X - X - X - X - X - X;  
 AVERAGE FOR 4 STATIONS XXXXXX XXXXXX.



[ PLATE 1209.]

TABLE XXIX.—*Relative amount of ozone in the atmosphere at night for months and year 1903, at 5 stations, also average line for 4 stations in Michigan—as indicated by averages of observations made nightly by exposing test-paper, prepared according to Schonbein's formula, from 9 P. M. to 7 A. M.—Recorded according to a scale of 10 degrees of coloration of the test-paper (greatest coloration by ozone equals 10) by observers for the State Board of Health.\**

Stations in Michigan.*	Divisions of the State.†	Degrees of coloration of test-paper.—Night observations.‡													
		Year.		Months, 1903.											
		Norm. §	1903.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 4 stations¶ .....		....	3.61	3.30	4.07	3.96	3.76	4.60	4.40	3.31	3.65	2.80	3.08	2.81	3.64
Traverse City.....	N. W.	....		a 5.69	6.29	6.31	d 6.51	b 6.97	6.28	....	c 5.41	5.04	5.40	5.86	6.12
Harrisville.....	N. E.	19 3.86	3.44	3.54	3.54	3.57	3.10	3.41	3.84	3.19	3.62	2.98	3.14	3.73	3.57
Thornville.....	B. & E.	27 4.31	6.21	6.86	7.87	7.05	5.80	6.02	6.41	4.55	5.49	4.58	6.11	5.96	7.73
Lansing, S. B. of H.....	C.	25 3.17	1.95	.76	1.62	1.09	1.90	3.44	3.61	3.42	2.46	2.01	1.46	.33	1.25
Ann Arbor.....	S. C.	11 2.66	2.87	2.05	3.26	4.12	4.24	5.54	3.74	2.09	3.01	1.61	1.59	1.23	1.09

\* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Table I.

† The full names of the divisions and the counties in each division are stated in Exhibit I, in the annual report for 1898 and succeeding reports.

‡ Allowance has been made for difference in sensitiveness in test-paper; explained in foot-note "i," Table XXVIII.

§ Numbers in this column state the average annual relative amount of ozone by night for periods of years ending in each case with December 31, 1903. The small figures above and at the right of the numbers which state the average denote the number of years included in the average.

¶ This line is an average for only the stations from which statements, complete, or nearly complete, were received for every month in the year. It does not include Traverse City.

|| The average for 11 months is 5.99.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

1. a For 29 days. b For 27 days. c For 26 days. d For 24 days.

Five lines in this table are graphically represented in Diagram IX.

**TABLE XXX.—Average amount of atmospheric ozone (day), by year and months, in 1903, compared with annual and monthly averages for 1902, and for the 26 years, 1877-1902.\* These averages are for groups of several stations in Michigan.**

Ozone by day.—Degrees of coloration of test paper.†													
Years, etc.	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 26 years, 1877-1902..	3.49	3.73	3.83	3.90	3.62	3.79	3.53	3.05	3.53	3.09	3.12	3.18	3.46
1902 (5 stations)....	3.74	3.95	4.12	4.07	4.01	4.21	4.27	3.38	4.04	3.09	3.12	3.05	3.60
1903 (4 stations).....	3.18	3.14	3.73	3.43	3.17	3.76	3.74	2.61½	3.44	2.45	2.64	2.43	3.64
In 1903 greater than av. for 26 years, 1877- 1902.....							.21						.18
In 1903 less than av. for 26 years, 1877-1902....	.31	.59	.10	.47	.45	.03		.44	.09	.64	.48	.75	
In 1903 greater than in 1902.....													.04
In 1903 less than in 1902	.56	.81	.39	.64	.84	.45	.53	.77	.60	.64	.48	.62	

\* At from 5 to 20 stations per year for the 26 years, 1877-1902. Just which stations in each year, up to 1897, are shown on page 53, report for 1898.

† In this exhibit allowance has been made for difference in sensitiveness of different lots of test-paper.

**TABLE XXXI.—Average amount of atmospheric ozone (night), by year and months, in 1903, compared with annual and monthly averages for 1902, and for the 26 years, 1877-1902.\* These averages are for groups of several stations in Michigan.**

Years, etc.	Ozone by night.—Degrees of coloration of test paper.†												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 26 years, 1877-1902..	3.72	3.95	4.31	4.34	4.05	4.10	3.82	3.19	3.44	3.05	3.28	3.46	3.88
1902 (5 stations).....	4.04	3.76	4.42	4.36	4.54	4.76	4.63	3.82	3.80	3.22	3.53	3.50	4.21
1903 (4 stations).....	3.61	3.30	4.07	3.96	3.76	4.60	4.40	3.31	3.65	2.80	3.08	2.81	3.64
In 1903 greater than av. for 26 years, 1877-1902.....						.50	.58	.12	.21				
In 1903 less than av. for 26 years, 1877-1902....	.11	.65	.24	.38	.29					.25	.20	.65	.24
In 1903 greater than in 1902.....													
In 1903 less than in 1902.	.43	.46	.35	.40	.78	.16	.23	.51	.15	.42	.45	.69	.57

\* At from 5 to 20 stations per year for the 26 years, 1877-1902. Just which stations in each year, up to 1897, are shown on page 53, report for 1898.

† In this exhibit allowance has been made for difference in sensitiveness of different lots of test-paper.

*Observations for Ozone at Lansing.*—Since July 1, 1884, the observations for ozone at Lansing have been taken at the new shelter for meteorological instruments in the southwest part of the Capitol yard. Previous to July 1, 1884, the observations had been taken at the office window. Exhibit E, page 60, of the report for 1885, shows that the average for the month of July, 1884, is greater at each observation—7 A. M. to 2 P. M., 2 P. M. to 9 P. M., and 9 P. M. to 7 A. M., at the shelter for instruments than at the office window. Possibly this fact should be taken into consideration in studying ozone at Lansing through a long period of years.



TABLE XXXII.—Average velocity of the wind in miles per hour, by year and months in 1903, compared with annual and monthly averages for 1902, and for the 21 years, 1882-1902.\* From registers of the Robinson self-registering anemometer.† These averages are for groups of several stations in Michigan.

Years, etc.	Average miles per hour.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 21 years, 1882-1902..	9.7	11.0	10.8	11.0	10.4	9.5	8.1	7.9	7.6	8.8	9.7	10.9	11.1
1902 (8 stations). . . . .	10.7	11.9	10.7	11.8	12.2	10.0	10.3	8.2	7.8	9.5	11.1	11.6	12.9
1903 (7 stations).....	10.1	11.2	11.8	10.0	11.7	9.3	7.9	8.4	8.2	9.6	10.4	10.9	11.8
In 1903 greater than av. for 21 years, 1882-1902.	.4	.2	1.0	.....	1.3	.....	.....	.5	.6	.8	.7	.....	.7
In 1903 less than av. for 21 years, 1882-1902. ....	.....	.....	.....	1.0	.....	.2	.2	.....	.....	.....	.....	.....	.....
In 1903 greater than in 1902. ....	.....	.....	1.1	.....	.....	.....	.....	.2	.4	.1	.....	.....	.....
In 1903 less than in 1902	.6	.7	.....	1.8	.5	.7	2.4	.....	.....	.....	.7	.7	1.1

\* At from 6 to 9 stations per year for the 21 years, 1882-1902.

† Gibbon's anemometer was used at Ann Arbor.

TABLE XXXIII.—Average velocity of the wind in miles per hour, by months for the 23 years, 1880-1902, and comparisons of 1902 with this average and with the year 1903. From registers of the Robinson self-registering anemometer in the office of the State Board of Health, State Capitol, Lansing, Michigan.

Years, etc.	Miles by self-registering anemometer.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 23 years, 1880-1902..	9.7	11.0	11.4	11.3	10.8	9.5	8.3	7.8	7.1	8.4	9.0	10.9	11.1
1902.....	9.8	11.0	10.2	10.9	11.5	9.6	9.8	7.8	6.3	7.9	10.0	10.6	11.7
1903.....	9.3	10.6	12.3	8.9	10.5	8.7	7.3	8.0	6.9	8.0	9.1	9.8	11.6
In 1903 greater than av. for 23 years, 1880-1902.....			.9					.2			.1		.5
In 1903 less than av. for 23 years, 1880-1902....	.4	.4		2.4	.3	.8	1.0		.2	.4		1.1	
In 1903 greater than in 1902.....			2.1					.2	.6	.1			
In 1903 less than in 1902	.5	.4		2.0	1.0	.9	2.5				.9	.8	.1



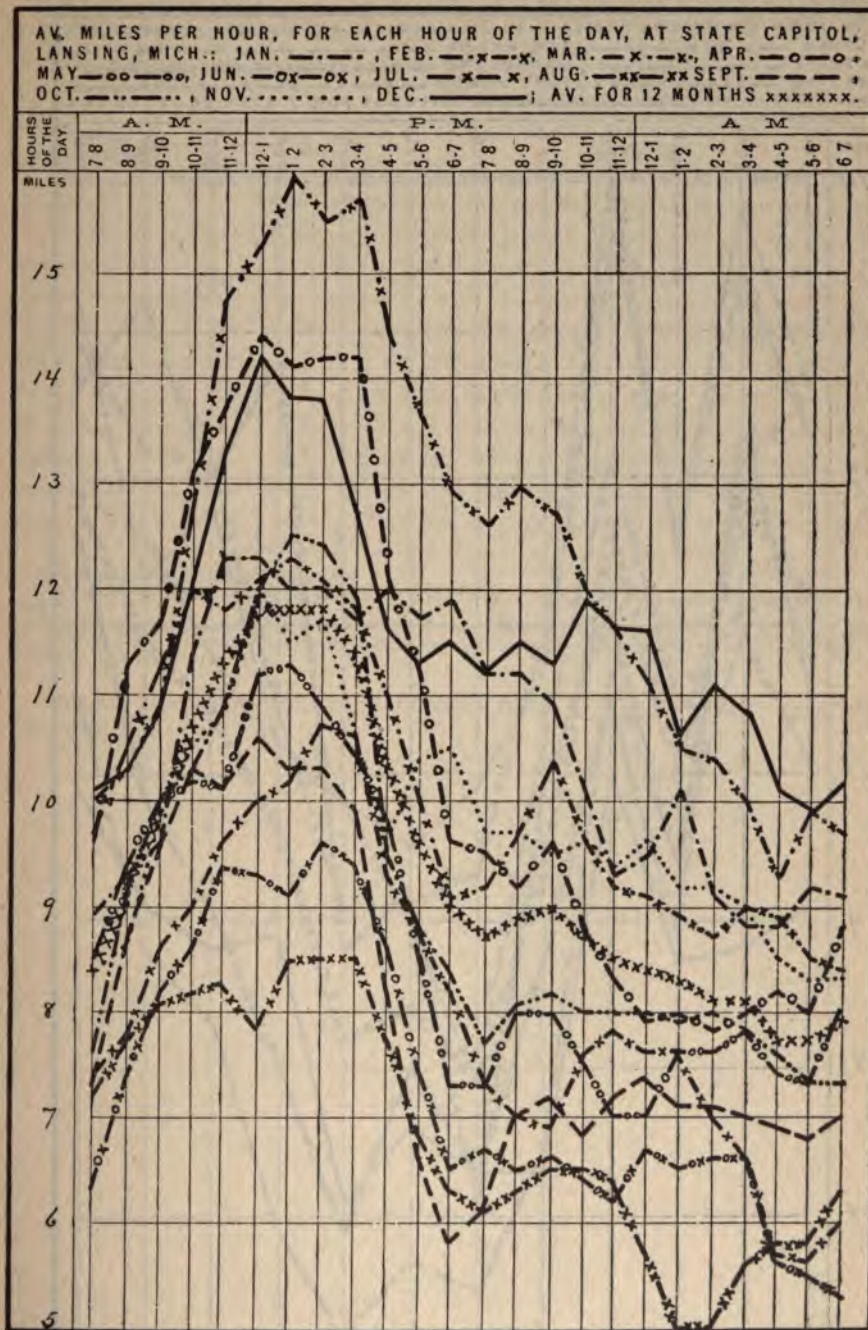
TABLE XXXIV.—Average velocity of the wind in miles per hour for each hour of the day, by months of the year 1903. Compiled from registers of the Robinson self-registering anemometer, exposed above the roof of the Capitol, and registering in the office of the State Board of Health, Lansing, Michigan.

Months.	Averages.		Hours (1903) and average miles per hour.																							
	Av. 24 years, 1880-1903.	1902, 1903.	A. M.						P. M.						A. M.											
			7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7
Year .....	9.7	9.8	9.4	8.4	9.2	9.9	10.7	11.3	11.8	11.8	11.4	10.3	9.6	9.0	8.7	8.9	9.0	8.7	8.5	8.4	8.3	8.1	8.1	7.7	7.7	7.9
January.....	11.0	11.0	10.5	*8.9	9.3	9.6	11.4	12.3	12.3	12.0	11.7	12.0	11.7	11.9	11.2	11.2	10.9	10.1	9.3	9.5	10.1	9.1	8.8	8.8	9.2	9.1
February.....	11.4	10.2	12.3	†10.0	10.3	10.9	12.8	14.7	15.3	15.9	15.5	15.7	14.4	13.6	12.9	12.6	13.0	12.7	12.0	11.6	11.1	10.5	10.4	10.0	9.3	9.9
March.....	11.2	10.9	10.1	†9.7	10.5	11.3	12.0	11.8	12.1	12.3	12.1	11.8	11.0	10.0	9.1	9.2	9.7	10.4	9.6	9.2	9.1	8.9	8.7	9.0	8.9	8.5
April.....	10.8	11.5	10.5	†9.6	11.3	11.7	13.1	13.7	14.4	14.1	14.2	14.2	12.1	11.2	9.6	9.5	9.2	9.6	8.8	8.3	7.9	8.0	7.8	8.0	8.2	8.0
May.....	9.4	9.6	8.7	†8.5	9.4	10.0	10.2	10.1	11.2	11.3	10.9	10.4	9.8	8.5	7.3	7.3	8.0	8.0	7.5	7.0	7.0	7.6	7.6	7.8	7.4	7.3
June .....	8.3	9.8	7.3	*6.3	7.4	8.2	8.6	9.4	9.3	9.1	9.6	9.4	8.6	7.4	6.5	6.7	6.5	6.6	6.4	6.2	6.7	6.5	6.6	6.6	5.6	5.5
July.....	7.8	7.8	8.0	7.4	7.8	8.6	9.0	9.6	10.0	10.2	10.7	10.6	9.3	8.7	8.2	7.3	7.0	6.9	7.6	7.8	7.6	7.6	7.0	6.6	5.7	5.6
August.....	7.1	6.3	6.9	†7.2	7.7	8.1	8.2	8.3	7.8	8.5	8.5	8.5	7.7	6.8	6.3	6.1	6.3	6.5	6.4	5.7	5.0	5.0	5.6	5.8	5.8	6.3
September.....	8.4	7.9	8.0	*7.3	8.7	9.6	10.3	10.1	10.6	10.3	10.3	9.9	8.2	6.6	5.8	6.1	7.0	7.2	6.8	7.2	7.4	7.1	7.1	7.0	6.9	6.8
October.....	9.0	10.0	9.1	7.6	9.2	10.0	10.3	10.9	12.0	12.5	12.4	11.9	9.5	8.8	8.4	7.7	8.1	8.2	8.0	8.0	8.0	7.9	8.0	7.8	7.6	7.3
November.....	10.9	10.6	9.8	†8.4	8.7	9.9	10.5	10.8	12.0	11.5	11.7	10.5	9.6	10.4	10.5	9.7	9.7	9.5	9.6	9.4	9.6	9.2	9.0	8.5	8.3	8.3
December.....	11.1	11.7	11.6	†10.1	10.3	10.8	12.1	13.3	14.2	13.8	13.8	12.7	11.6	11.3	11.5	11.2	11.5	11.3	11.9	11.6	11.6	10.6	10.1	10.8	10.1	9.9

\*For only about 28 days. †For only about 26 days. ‡For only about 30 days. §For only about 29 days. ¶For only about 30 days.

The statements in the third figure column in Table XXXIV, of the average velocity of the wind in miles per hour, by months, during the year 1903, are graphically represented in Diagram XI. The remaining columns of Table XXXIV, for 1903, are graphically represented in Diagram X.

DIAGRAM X.—VELOCITY OF WIND, BY HOURS AND MONTHS, 1903.



[ PLATE 1210. ]





TABLE XXXV.—Average velocity of the wind in miles per hour for the year and for each month of the year 1903 at 7 stations in Michigan; also average for 7 stations. Computed from registers of the Robinson self-registering anemometer,\* by observers for the State Board of Health, and for the U. S. Weather Bureau.

Stations in Michigan.†	Divisions of the State.	Miles, by self-registering anemometer.													
		Year.		Months, 1903.											
		Norm ‡	1903.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 7 stations . . . . .			10.1	11.2	11.8	10.0	11.7	9.3	7.9	8.4	8.2	9.6	10.4	10.9	11.8
Marquette.....	U. P.	9.9 <sup>18</sup>	10.9	12.5	12.1	9.4	11.1	9.9	7.1	9.2	8.8	12.8	12.0	13.2	12.6
Sault Ste. Marie.....	U. P.	8.6 <sup>12</sup>	8.6	9.1	8.8	8.7	10.0	7.3	7.3	7.6	7.1	8.9	8.8	9.1	9.9
Alpena.....	N. E.	10.1 <sup>5</sup>	10.5	11.2	11.1	10.5	12.1	10.2	7.9	9.0	9.8	10.1	10.8	11.6	11.9
Port Huron.....	B. & E.	10.8 <sup>22</sup>	11.4	12.3	13.4	11.5	14.1	10.9	9.3	9.1	9.1	10.4	12.1	12.2	12.9
Lansing. ....	C.	9.7 <sup>24</sup>	9.3	10.6	12.3	8.9	10.5	8.7	7.3	8.0	6.9	8.0	9.1	9.8	11.6
Ann Arbor.....	S. C.	8.3 <sup>8</sup>	8.5	10.1	10.9	9.4	10.7	7.4	6.5	6.7	6.2	6.9	8.3	8.8	10.5
Detroit . . . . .	S. E.	10.1 <sup>22</sup>	11.5	12.6	13.8	11.6	13.7	10.7	9.9	9.5	9.8	10.2	11.8	11.3	13.2

\* Gibbon's anemometer was used at Ann Arbor.

† The names of observers, their places of observation, and the counties in which these places are situated are stated in Table I.

‡ Numbers in this column state the average velocity of the wind in miles per hour for periods of years ending in each case with December 31, 1903. The small figures above and at the right of numbers which state the average denote the number of years included in the average.

Graphic representations of statements made in Table XXXV are given in Diagram XI.

TABLE XXXVI.—DIRECTION OF WIND, 1891-1900.—*Number of observations per month (made tri-daily), at which the wind was blowing from the several (eight) points of compass.—Annual and monthly averages for the 10 years, 1891-1900, at stations in Michigan.\**

Points of compass.	Average number of observations per month.—10 years, 1891-1900.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All observations.....	90	92	84	92	89	91	88	91	91	89	92	89	92
Calm.....	5	3	2	4	5	6	7	8	8	7	6	3	3
North.....	7	6	5	8	9	9	6	8	9	7	7	6	4
Northeast.....	8	5	7	11	11	10	9	7	9	7	6	6	5
East.....	6	5	5	8	9	7	7	5	5	5	4	3	3
Southeast.....	9	9	8	11	11	10	10	8	8	10	12	9	7
South.....	10	10	8	8	7	9	8	8	9	10	11	12	12
Southwest.....	21	25	20	16	15	19	20	21	21	22	22	24	29
West.....	12	16	15	12	11	11	11	13	9	10	11	13	15
Northwest.....	13	15	14	15	12	12	9	12	13	12	13	14	13

\* At 11 stations in 1891; 11 in 1892; 8 in 1893; 10 in 1894; 9 in 1895; 10 in 1896; 9 in 1897; 8 in 1898; 9 in 1899; 8 in 1900.

Graphic representations of statements made in Table XXXVI, are given in Diagram XIII.

DIAGRAM XIII.—WIND, DIRECTION, IN MICH., AVERAGE 10 YEARS, 1891-1900.

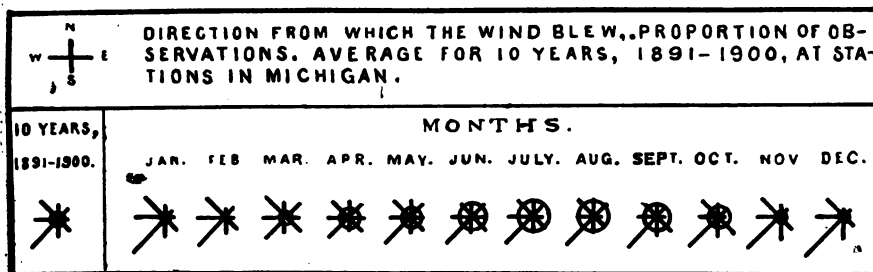




TABLE XXXVII.—*Number of observations per month (at 7 A. M., 2 P. M., and 9 P. M., daily), at which the wind was blowing from each of the 8 principal points of compass, during the year and during each month of the year 1903. Average for 4 stations in Michigan.\**

Points of compass.	Average number of observations per month, 1903.												
	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All observations(4 stations)	91	93	84	93	90	93	90	93	93	90	93	90	93
Calm.....	0	0	0	0	0	0	0	0	0	0	1	0	1
North.....	3	2	2	3	6	1	4	3	3	2	3	3	2
Northeast.....	11	3	7	14	27	23	24	6	13	4	9	2	4
East.....	5	4	2	6	8	6	13	2	15	3	4	0	2
Southeast.....	12	9	4	18	11	29	8	13	14	15	8	7	8
South.....	5	6	3	4	3	7	2	3	5	14	4	8	5
Southwest.....	27	32	34	30	19	21	12	26	20	31	29	35	36
West.....	13	21	17	9	6	4	11	14	11	8	15	24	15
Northwest.....	15	16	16	11	12	3	18	25	12	15	22	12	21

\* The names of observers, their places of observation, and the counties and divisions of the State in which those places are situated are stated in Table I.

Graphic representations of statements in Table XXXVII are given in Diagram XIV.

DIAGRAM XIV—WIND, DIRECTION, IN MICH., YEAR AND MONTHS, 1903.



[PLATE 1213.]

TABLE XXXVIII.—Average number of observations per month for the year 1903, at which the wind was blowing from each of the 8 principal points of the compass, at each of 4 stations\* in Michigan; also the average line for the 4 stations.

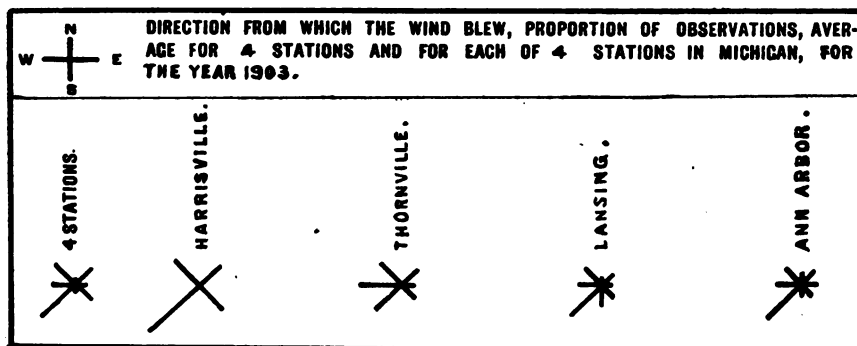
Stations in Michigan.*	Divisions of the State.†	Average number of observations per month, 1903.									
		All obs.	Calms.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.
Average for 4 stations.....		91	0	3	12	6	12	5	27	13	15
Harrisville.....	N. E.	91	0	0	16	0	18	0	37	1	20
Thornville.....	B. & E.	91	0	1	12	8	10	1	20	23	16
Lansing, S. B. of H.....	C.	91	0	4	9	6	10	12	24	13	13
Ann Arbor.....	S. C.	91	1	5	9	8	9	8	27	14	12

\* The names of observers, their places of observation, and the counties in which these places are situated are stated in Table I.

† The full names of the divisions and the counties in each division are stated in Exhibit I, in the annual report for 1903 and preceding reports.

Graphic representations of statements in Table XXXVIII, are given in Diagram XV.

DIAGRAM XV—WIND, DIRECTION, AT STATIONS IN MICHIGAN, 1903.



[ PLATE 12 14 ]



TABLE XXXIX.—CONTINUED.—*Direction of wind, months in 1903. Observations at which the wind was blowing from direction named.*

Stations in Michigan.*	Divisions of the State.†	April.										May.										June.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
		Total.		Calm.		N.		N.E.		E.		S.E.		S.		S.W.		W.		N.W.		Total.		Calm.		N.		N.E.		E.		S.E.		S.		S.W.		W.		N.W.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		

\* † These foot notes are at bottom of first page of this table.

Graphic representations of statements for four lines in this table are given in Diagram XII, which is explained on page 62 of the annual report for 1898, and in preceding reports.

TABLE XXXIX.—CONTINUED.—*Direction of wind, months in 1903.—Observations at which the wind was blowing from direction named.*

Stations in Michigan.*	Divisions of the State.*	July.										August.										September.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
		Total.		Calm.		N.		N. E.		E.		S. E.		S.		S. W.		W.		N. W.		Total.		Calm.		N.		N. E.		E.		S. E.		S.		S. W.		W.		N. W.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				

\* † These foot-notes are at bottom of first page of this table.

Graphic representations of statements for four lines in this table are given in Diagram XII, which is explained on page 62 of the annual report for 1898, and in preceding reports.



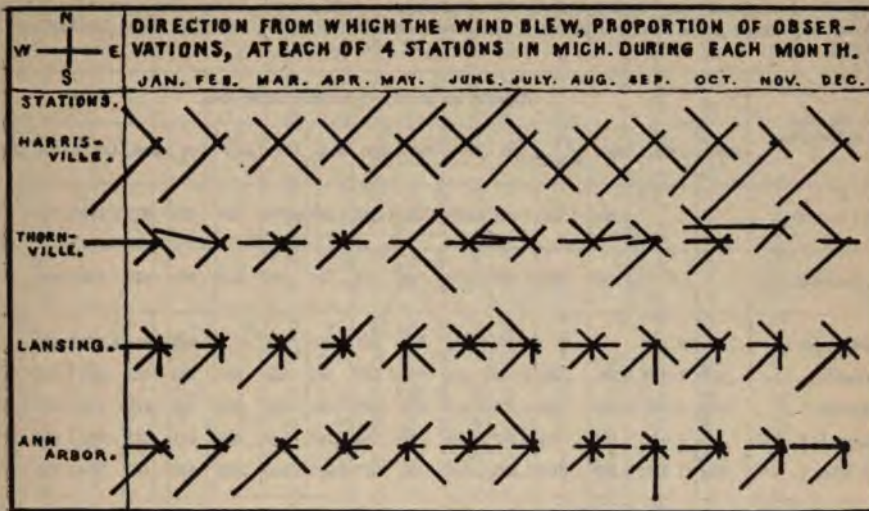
TABLE XXXIX.—CONCLUDED.—*Direction of wind, months in 1903. Observations at which the wind was blowing from direction named.*

Stations in Michigan.*	Divisions of the State.*	October.										November.										December.																
		Calm.					N. N.E. E. S.E. S. S.W. W. N.W.					Calm.					N. N.E. E. S.E. S. S.W. W. N.W.					Calm.					N. N.E. E. S.E. S. S.W. W. N.W.											
		Total.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	
Av. 4 stations†.....		93	1	3	9	4	8	4	29	15	22	90	0	3	2	0	7	8	35	24	12	93	1	2	4	2	8	5	36	15	21							
Traverse City.....	N. W.	93	22	12	9	1	2	11	22	11	3	90	11	8	3	3	8	33	10	11	93	4	5	1	0	4	15	35	13	16								
Harrisville.....	N. E.	93	0	0	15	0	13	0	39	0	26	90	0	0	0	0	9	0	60	5	16	93	0	0	4	0	12	0	49	0	28							
Thornville.....	B. & E.	93	1	0	6	8	7	0	24	19	28	90	0	0	7	0	10	2	19	52	0	93	0	0	4	9	3	1	30	14	32							
Lansing, S. B. of H.,	C.	93	2	3	9	4	5	10	26	18	16	90	0	7	1	1	5	14	28	18	16	93	0	2	5	0	11	8	36	15	16							
Ann Arbor.....	S. C.	93	0	9	4	4	6	6	25	23	16	90	0	4	0	0	4	14	32	21	15	93	2	4	4	0	4	12	29	30	8							

\*† These foot-notes are at bottom of first page of this table.

Diagram XII exhibits lines showing, by months, directions of wind at each of four stations in this table; for each month and station the diagram represents the figures given in this table for the same month and stations; it is explained on page 62 of the annual report for 1898, and in preceding reports.

DIAGRAM XII.—WIND, DIRECTION, AT STATIONS, BY MONTHS IN 1903.



[PLATE 1212.]

TABLE XL.—Average daily range of atmospheric pressure (as determined from three daily observations) for months and year 1903, at 5 stations, also average line for 4 stations\* in Michigan—stations arranged in order by latitude, those farthest north first.

Stations in Michigan.*	Average daily range of barometer.—Year and months, 1903.														
	Norm. †	1902.	1903.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 4 stations‡.....			.197	.263	.359	.192	.210	.132	.120	.125	.128	.138	.190	.247	.265
Traverse City.....		.202	§	<sup>a</sup> .271	.327	.196	<sup>d</sup> .238	<sup>e</sup> .131	.117	....	<sup>e</sup> .119	.149	.237	.256	.236
Harrisville.....	<sup>g</sup> .205	.202	.201	.253	.341	.200	.214	.146	.130	.127	.146	.148	.208	.242	.260
Thornville.....	<sup>20</sup> .207	.192	.187	.255	.347	.173	<sup>b</sup> .195	.121	.116	.124	.124	.127	.175	.237	.251
Lansing, S. B. of H.....	<sup>22</sup> .201	.191	.199	.266	.367	.199	.218	.125	.116	.121	.119	.132	.198	.255	.270
Ann Arbor.....	<sup>23</sup> .202	.193	.202	.276	.380	.196	.214	.136	.117	.126	.122	.145	.180	.252	.277

\* The names of observers, their places of observation, and the counties in which these places are situated are stated in Table I. The average atmospheric pressure at each of these stations, by months, in 1903, is given in Table XLIII.

† Numbers in this column state the average daily range of atmospheric pressure for periods of years ending in each case with December 31, 1903. The small figures above and at the right of numbers which state the average daily range denote the number of years included in the average.

‡ Not including Traverse City.

§ The average for 11 months is .207.

a For 28 days. b For 26 days. c For 25 days. d For 23 days.

NOTE.—The latitude and elevations of the stations in Table XL, are stated in Table II.

The daily range is found by subtracting the lowest observation from the highest observation, 7 A. M. to 7 A. M.

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TABLE XLI.—Range of atmospheric pressure (as determined from three daily observations) for the year and for each month and for the average month of the year 1903, at 4 and at each of the 4 stations, and average line for 4 stations in Michigan; also the normal—average monthly range for a series of years. Stations named in order by latitude, those farthest north first.

Stations in Michigan.	Range of barometer.—Year and months, 1903.															
	Norm. *	1902.	1903.	Av. Month	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
For 4 stations†.....	.....	.....	1.854	1.252	1.644	1.583	1.152	1.265	1.240	1.071	.920	.970	.935	1.185	1.701	1.359
Av. for 4 stations‡.....	.....	.....	1.484	.896	1.279	1.273	.798	.975	.797	.707	.610	.590	.654	.879	1.256	.932
Traverse City. . . . .	.....	2.189	.....	\$	a 1.168	1.161	.947	d .951	e .806	.731	....	c .489	.611	1.046	1.423	.867
Harrisville.....	.950 <sup>9</sup>	1.819	1.380	.908	1.170	1.135	.785 <sup>b</sup>	1.037	.815	.865	.704	.705	.653	.906	1.165	.960
Thornville. . . . .	.948 <sup>20</sup>	1.903	1.399	.849	1.279	1.314	.753	.898	.643	.657	.550	.565	.613	.743	1.215	.953
Lansing, S. B. of H.....	.923 <sup>22</sup>	1.958	1.615	.911	1.347	1.339	.894	.988	.767	.626	.563	.531	.634	.959	1.352	.926
Ann Arbor.....	.924 <sup>22</sup>	1.911	1.542	.916	1.320	1.303	.759	.977	.963	.680	.623	.558	.715	.909	1.294	.888

\* Numbers in this column state the average monthly range of atmospheric pressure for a period of years ending in each case with December 31, 1903. The small figures above and at the right of the numbers which state the average denote the number of years included in the average.

† Represents the difference between the highest of 4 stations and the lowest of 4 stations for year and for each month of year, not including Traverse City.

‡ Represents sum of ranges at 4 stations divided by 4.

§ The average for 11 months is .927.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 28 days. b For 26 days. c For 25 days. d for 23 days.

Norm.—The statements in the (\*) foot-note to Table XL, apply also to Table XLI.

TABLE XLII.—Average atmospheric pressure, by year and months, in 1903 compared with annual and monthly averages for 1902, and for the 26 years, 1877–1902.\* These averages are for groups of several stations in Michigan.

Years, etc.	Average atmospheric pressure.—Inches of mercury.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 26 years, 1877–1902..	29.132	29.145	29.139	29.121	29.127	29.093	29.096	29.112	29.133	29.171	29.160	29.146	29.139
1902 (6 stations) .....	29.097	29.180	29.040	29.078	29.041	29.144	29.029	29.086	29.103	29.093	29.134	29.101	29.129
1903 (5 stations) .....	29.073	28.961	29.081	29.203	28.994	29.154	29.034	29.042	29.058	29.154	29.109	29.084	28.998
In 1903 greater than av. for 26 years, 1877–1902.....				.082		.061							
In 1903 less than av. for 26 years, 1877–1902....	.059	.184	.058		.133		.062	.070	.075	.017	.051	.062	.141
In 1903 greater than in 1902.....			.041	.125		.010	.005			.061			
In 1903 less than in 1902	.024	.219			.047			.044	.045		.025	.017	.131

\* At from 6 to 20 stations per year for the 26 years, 1877–1902. Just which stations in each year, up to 1897, are shown on page 75, report for 1898.



TABLE XLIII.—Average atmospheric pressure for months and year 1903, at each of 6 stations in Michigan; also averages for 5 stations, as indicated by the height, in inches, of Mercury in the barometer. Corrected for temperature. Reduced to 32° F. (for some stations not corrected for instrumental errors\*).—Average of observations made daily at 7 A. M., 2 P. M. and 9 P. M. by observer† for the State Board of Health.

Stations in Michigan. †	Divisions of the State ‡	Years.		Months, 1903.												Inches of Mercury.—Atmospheric pressure.		
		Norm. &	1903.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Av. for 5 stations ¶			29.073	28.961	29.081	29.203	28.994	29.154	29.034	29.042	29.038	29.154	29.109	29.084	28.998			
Traverse City.....	N. W.			29.178	29.305	29.427	29.226	29.300	29.284		29.262	29.345	29.356	29.330	29.230			
Harrisville.....	N. E.	29.318 <sup>9</sup>	29.309	29.192	29.308	29.450	29.267	29.367	29.260	29.265	29.303	29.372	29.344	29.328	29.227			
Thornville.....	B. & E.	28.954 <sup>24</sup>	28.948	28.861	28.979	29.089	28.890	29.047	28.920	28.946	28.947	29.049	28.952	28.887	28.809			
Agricultural College.....	C.	29.072 <sup>22</sup>	28.984	28.855	29.022	29.105	28.873	29.041	28.985	28.922	28.956	29.058	29.017	29.015	28.946			
Lansing, S. B. of H.....	C.	29.005 <sup>25</sup>	29.081	28.962	29.083	29.204	29.008	29.143	29.026	29.057	29.064	29.161	29.135	29.112	29.020			
Ann Arbor.....	S. C.	29.004 <sup>23</sup>	29.041	28.925	29.013	29.167	28.934	29.143	28.978	29.022	29.021	29.130	29.095	29.077	28.990			

\* A correction has been made for instrumental error of barometer at Ann Arbor; .004 has been added to each monthly average during the year 1903. At the Agricultural College, —.013 has been subtracted from each monthly average. For other stations the instrumental error of barometer is not known.

† The names of observers, their places of observation, and the counties in which these places are situated are stated in Table I.

‡ The full names of divisions and the counties in each division are stated in Exhibit I, in the annual report for 1898 and preceding reports.

§ Numbers in this column state the average annual atmospheric pressure for periods of years ending in each case with December 31, 1903.

¶ This line is an average for 5 stations, at which observations, nearly complete, were received for every month in the year. It does not include Traverse City. Green's standard barometer was used at all the six stations for 1903.

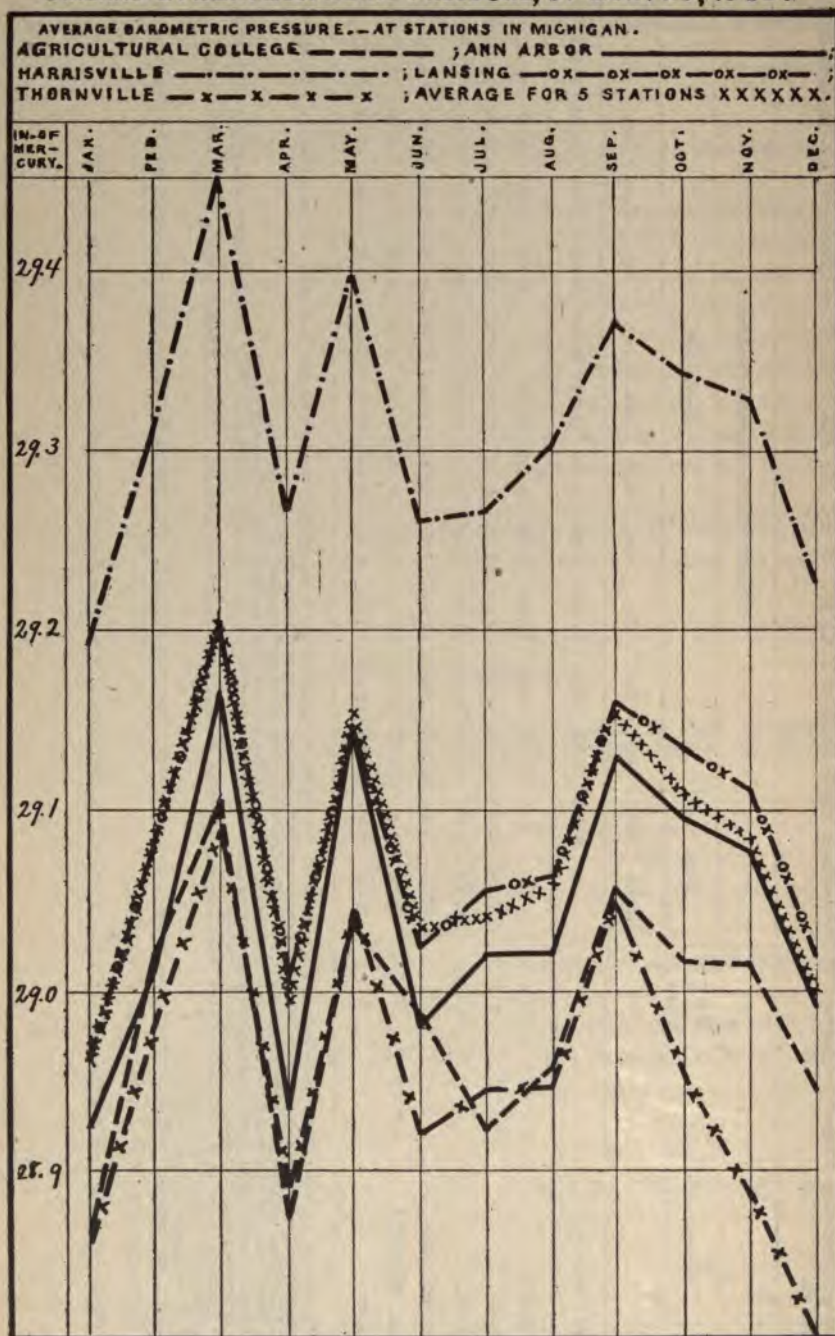
|| The average for 11 months is 29.303.

Note.—Computations of monthly averages for the year 1903 were furnished by the observers at Ann Arbor. The remainder of the computations were made at the office of the State Board of Health.

a For 28 days. b For 26 days. c For 25 days. d For 23 days.

The average line and lines for five stations in this table are graphically represented in Diagram XVI.

DIAGRAM XVI.—ATMOSPHERIC PRESSURE, BY MONTHS, 1903.



[ PLATE 1215. ]



TABLE XLIV.—Average daily range of atmospheric pressure, by year and months, in 1903, compared with annual and monthly averages for 1902, and for the 21 years, 1882-1902.\* These averages are for groups of several stations in Michigan.

Years, etc.	Average daily range of barometer.—Year and months, 1903.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 21 years, 1882-1902..	.206	.295	.283	.262	.208	.164	.138	.123	.127	.168	.203	.244	.260
1902 (5 stations) .....	.196	.263	.206	.208	.225	.168	.177	.115	.123	.155	.250	.207	.254
1903 (4 stations) .....	.197	.263	.359	.192	.210	.132	.120	.125	.128	.138	.190	.247	.265
In 1903 greater than av. for 21 years, 1882-1902. ....			.076		.002			.002	.001			.003	.005
In 1903 less than av. for 21 years, 1882-1902. ....	.009	.032		.070		.032	.018			.030	.013		
In 1903 greater than in 1902. ....	.001	0	.153					.010	.005			.040	.011
In 1903 less than in 1902. ....				.016	.015	.036	.057			.017	.060		

\* At from 5 to 18 stations per year for the twenty-one years, 1882-1902. Just which stations in each year, up to 1897, are shown on page 78, report for 1898.

TABLE XLV.—Range of atmospheric pressure, by year and months, in 1903, compared with annual and monthly averages for 1902, and for the 21 years, 1882-1902.\* These averages are for groups of several stations in Michigan.

Years, etc.	Range of barometer.—Year and months, 1903.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 21 years, 1882-1902..	.930	1.253	1.259	1.166	1.004	.770	.686	.568	.586	.791	.968	1.072	1.114
1902 (5 stations) .....	.954	1.187	1.564	1.301	1.087	.638	.825	.540	.570	.690	1.049	.808	1.191
1903 (4 stations) .....	.896	1.279	1.273	.798	.975	.797	.707	.610	.590	.654	.879	1.256	.932
In 1903 greater than av. for 21 years, 1882-1902.....		.026	.014	.....	.....	.027	.021	.042	.004	.....	.....	.184	.....
In 1903 less than av. for 21 years, 1882-1902....	.034	.....	.....	.368	.029	.....	.....	.....	.....	.137	.089	.....	.182
In 1903 greater than in 1902.....		.092	.....	.....	.....	.159	.....	.070	.020	.....	.....	.448	.....
In 1903 less than in 1902.	.058	.....	.291	.503	.112	.....	.118	.....	.....	.036	.170	.....	.259

\* At from 5 to 18 stations per year for the twenty-one years, 1882-1902. Just which stations in each year, up to 1897, are shown on page 78, report for 1898.

*Sunshine and clouds.*—On the back of each blank register supplied by this Board to observers, on which they are to register meteorological data, is a statement that "One observer has reported a record of days 'all or nearly all cloudy' and days 'all or nearly all sunshine.' The State Board of Health would be glad to have such a report from all observers who can conveniently make it. Memoranda may be made in a column headed 'cloudy or sunny,' days more than eighty per cent of clouds being marked with the abbreviation 'C,' indicating *cloudy*, and days with less than 20 per cent of clouds with an 'S,' indicating *sunshine*." Table XLVI, exhibits the results of such observations at nine stations in Michigan, for the several months in 1903.

TABLE XLVI.—*Statements of the number of days in each month which were reported "sunny," "partly cloudy," and "cloudy," by observers at stations in Michigan.*

Stations in Michigan.	1903.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Marquette .....	S.	2	7	4	9	9	11	9	6	5	11	6	3
	P. C.	12	11	9	6	6	8	12	10	10	12	6	7
	C.	17	10	18	15	16	11	10	15	15	8	18	21
Sault Ste. Marie .....	S.	4	9	9	12	8	16	14	7	9	7	1	3
	P. C.	8	8	9	14	7	5	11	5	11	9	5	5
	C.	19	11	13	9	9	7	12	13	16	13	20	23
Traverse City .....	S.	1	4	7	11	12	15	20	7	7	16	5	1
	P. C.	8	4	7	7	6	4	7	7	7	3	4	3
	C.	22	20	17	12	12	9	7	17	16	12	21	27
Alpena .....	S.	2	4	8	10	10	8	10	6	9	13	3	2
	P. C.	5	11	8	4	9	10	11	10	8	5	6	9
	C.	24	13	15	16	12	12	10	15	13	13	21	20
Port Huron .....	S.	5	7	5	13	18	4	7	10	7	13	6	3
	P. C.	9	8	9	7	7	13	15	7	15	9	5	8
	C.	17	13	17	10	6	13	9	14	8	9	19	20
Thornville .....	S.	6	10	8	13	20	11	14	11	15	19	12	3
	P. C.	6	2	6	8	6	5	15	2	5	4	4	4
	C.	19	16	17	9	5	14	2	18	10	8	14	24
Lansing .....	S.	4	6	5	12	12	9	12	9	11	13	10	6
	P. C.	4	8	12	4	8	0	5	6	5	2	3	3
	C.	23	14	14	14	11	21	14	16	14	16	17	22
Ann Arbor .....	S.	4	5	5	12	24	10	11	9	14	18	10	3
	P. C.	8	11	12	6	4	7	13	7	10	2	1	7
	C.	19	12	14	12	3	12	7	15	6	11	19	21
Detroit .....	S.	2	9	6	13	13	5	9	7	10	13	5	2
	P. C.	9	6	9	7	12	13	20	15	14	7	7	6
	C.	20	13	16	10	6	12	2	9	6	11	18	23



# THE TIME OF GREATEST PREVALENCE OF EACH DISEASE.

## CONTRIBUTIONS TO THE STUDY OF THE CAUSATION OF SICKNESS.

A STATISTICAL REPORT BASED ON WEEKLY POSTAL-CARD REPORTS OF SICKNESS IN MICHIGAN DURING THE YEAR 1903, AND COMPARISONS WITH PRECEDING YEARS.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE STATE BOARD OF HEALTH.

This paper is the twenty-seventh in a series of articles upon the same general subject begun in the latter part of 1876. It presents a summary of the compilation of weekly reports of sickness in Michigan in 1903. It includes a series of graphic illustrations which show by months, in 1903, the rise and fall of twenty-eight of the most prominent diseases in Michigan.

The value of sickness statistics is indicated on page 702 of "A Manual of Practical Hygiene," by Chas. Harrington, M. D., Assistant Professor of Hygiene in the Medical School of Harvard University, as follows:—

"Registration of Sickness, if it were possible, would afford a far more efficient index of the sanitary condition of the population than the registration of deaths, which gives us simply the number of cases of sickness which ended fatally, but no idea of the duration thereof or of the number of persons temporarily incapacitated. A disease ordinarily regarded as fairly dangerous may prevail very extensively in a mild form, and be attended by a very low death-rate, and, again, may exist to a lesser extent, but in an unusually severe form, with a high proportion of fatalities. Many diseases, again, are temporarily disabling and often widely prevalent, but play a small part in mortality returns. Tonsillitis, for example, is responsible for much discomfort and lost time; its prevalence has some meaning, but its death roll is exceedingly small. Rheumatism is much more widespread than mortality returns would imply; chicken-pox is relatively unimportant, but in some places its notification is required as a safeguard against the spread of smallpox incorrectly diagnosed as varicella; gonorrhea, without being fatal, does more harm than commonly is supposed; and syphilis, also not immediately and directly fatal, sends its victims into the mortality returns through various avenues.

The sickness statistics of Michigan are unique. There are no other sickness statistics in the world based upon *weekly* reports and covering any considerable area, for a long series of years, and showing the relation of each disease to season of the year and to each of the several meteorological conditions.

The weekly reports of sickness, upon which this article is based, are made by representative physicians in active, general, practice; and an effort is made to obtain such reports from all parts of the State, so that they shall correctly represent the sickness which occurs.

One of the objects of this compilation is to learn the time of the greatest and of the least prevalence of each of the important diseases in the State, and the relative prevalence in each month, and to note the connection of this prevalence with each of the meteorological conditions in the State.

Tables are given showing the per cent of the weekly *reports* and the per cent of *observers* which stated the presence of the various diseases; and by comparing Table 1 with Table 4, we see the correspondence in the two lines of evidence,



—that of the “prevalence” of the diseases as shown by the per cent of *reports*, and the “area of prevalence” as shown by the per cent of *observers*, the diseases following each other in a somewhat similar order from highest to lowest—the diseases being arranged in each table in the order of their greatest reported prevalence in 1903.

For purposes of comparison of the sickness from the several diseases in the year under consideration with that in preceding years, some of the tables exhibit the facts relative to the sickness in Michigan from each of the important diseases in each of several preceding years, and some of the tables permit of quantitative comparisons of the latest year with the averages of the ten preceding years.

Propositions are stated as to the relations of specified meteorological conditions, and diseases are mentioned under these propositions in such manner as to suggest one method of studying some of the facts brought out in the compilation. Casual observation shows that certain diseases are much more prevalent than at the average time in the hot months, while certain other diseases are much more prevalent in the cold months. The relation between these diseases and the atmospheric temperature is well marked, but accurate statistics like these are needed to show just what that relation is. We find, also, that other meteorological conditions than atmospheric temperature have a marked effect upon many of the diseases, apparently diminishing the effect of temperature in some instances, increasing its effect in other instances, as is the case with the wind. For these reasons the State Board of Health undertakes, by a compilation of the weekly reports of sickness in connection with the various meteorological conditions, to learn what constant, and, therefore, probably causal relations exist between the humidity of the air, the ozone, the velocity of the wind, the atmospheric pressure, etc., and the increased or diminished prevalence of each disease in certain months as compared with other months in the same year, or with the same month in other years or series of years.

To facilitate the study of the causes of sickness and deaths, the State is divided into eleven geographical divisions, the counties in each of which were indicated by lines on maps of the State, on pages 201 and 217 of the report of this Board for 1886.

*Physicians should have compensation for weekly reports of sickness.*—Great credit is due the busy medical practitioners in Michigan who forward these reports of sickness. The service is, as a rule, without compensation; a few health officers have slight pay from their local boards of health. Each one should have full compensation. No other class of persons has knowledge of the facts that are necessary in the compilation of health statistics; and it is greatly to the credit of physicians that they are so willing to coöperate in every effort made to advance the public health.

*Plan of the weekly card reports.*—The plan of the weekly reports remains the same as last year. Observers now report only the diseases under their own personal observation. Previous to the year 1885, some of the observers reported such diseases as they believed to be present in their locality, even though not under their own observation. Details of the method of securing and the plan of marking these reports may be thus stated.

The blanks for the weekly reports are printed on postal cards, which are supplied to the observers of diseases. Blank record books in which to preserve copies of the reports, remarks, etc., are also supplied to these observers, to be retained by them. The reports are forwarded weekly to the Secretary of the State Board of Health at Lansing.

The plan of making the report is as follows: Each observer is requested to mark the disease of which there was the greatest number of cases under his observation during the week for which the report is made, 1; that of which there was the next greatest number of cases, 2; the next, 3; and so on, applying consecutive numbers to the diseases reported present; but marking with the same figure all



diseases of which there is the same number of cases; to write 0 opposite each disease mentioned of which there was no case; to apply these numbers without regard to the severity of the cases; to include all cases, without regard to when they were taken sick, so long as they are actually sick with the given disease; to include all cases "under the observation" of the observer. A blank is left on the card for the convenience of those observers who prefer to state the number of cases rather than the order of prevalence by the foregoing method.

To illustrate the method of making the reports, the following copy of one of the blanks now in use is given, correctly marked, in the "prevalence" column, for the number of cases stated on the right hand margin. It should be remembered that the numbers in the "prevalence" column denote simply the relative order in which the several diseases appear to be prevalent, and do not denote a definite number of cases; so that a disease might one week be marked 4, and the following week, with the same number of cases, be marked 1. Names of diseases printed in italics are not *printed* on the postal blanks, but are supposed to have been *written* on the report by the observer.

Cancer, gonorrhea and syphilis were first printed on the postal blanks in July, 1903, but as not all of the observers were supplied with blanks which included these diseases until the end of 1903, this compilation does not include the reports of these diseases made by a portion of the observers in 1903.

[Ed. 51.] REPORT of diseases under the observation of representative physicians in active general practice.

Diseases in ..... and vicinity,  
week ending Sat., ....., 190...

REMARKS: city or village in which the disease is.	DISEASES.	CASES OBSERVED.	
		Order a.	No. of Cases.
a. If you do not state the number of cases, please mark the diseases of which there is the greatest number of cases, 1 in the order column; the disease having next greatest number of cases, 2; the next, 3; and so on for each disease, writing the same figures opposite diseases having the same number of cases. Write 0 opposite each disease of which there is no case under your observation. [Full statement of plan on record-book cover.] A blank indicates that the item has been overlooked. Please mail this signed and dated, as soon as convenient after close of week.  NOTICE!—If this report includes a communicable disease, please write, below, the township,	Brain, Inflammation of.....	0	0
	Bowels, Inflammation of....	9	2
	Bronchitis.....	6	5
	Meningitis.....	0	0
	Cholera Infantum.....	0	0
	Cholera Morbus.....	0	0
	Consumption, Pulmonary...	9	2
	Croup, Membranous.....	0	0
	Diphtheria.....	0	0
	Diarrhea.....	4	7
	Dysentery.....	9	2
	Erysipelas.....	0	0
	Fever, Intermittent.....	7	4
	Fever, Remittent.....	9	2
	Fever, Typhoid { Enteric.....	10	1
	{ Typho-malarial.....	0	0
	Influenza.....	3	8
	Kidney, Inflammation of....	0	0
	Measles.....	8	3
	Neuralgia.....	2	9
	Pleuritis.....	10	1
	Pneumonia.....	9	2
	Puerperal Fever.....	0	0
	Rheumatism.....	1	10
	Scarlet Fever.....	0	0
	Smallpox.....	10	1
	Tonsillitis.....	5	6
	Whooping-cough.....	8	3
	Cancer.....	9	2
	Gonorrhea.....	7	4
	Syphilis.....	8	3

M. D.



*Bulletines of "Health in Michigan."*—During the year 1903 the issue of the weekly and monthly bulletins of "Health in Michigan" has been continued. These bulletins are compiled from the regular weekly card reports of physicians in all parts of the State, and from the health officers' reports of communicable diseases, which reports, excepting those weekly card reports made by voluntary observers, are made to the Secretary of the State Board of Health in compliance with law.

The bulletins give to the members of the State Board of Health, local health officers, and when published to the public, information concerning the "diseases which cause most sickness" in the State, the relative amount of sickness from each disease, and comparisons with the preceding week or month, thus showing any sudden increase or decrease which may have occurred in the prevalence of any disease, together with a comparison of the various meteorological conditions; also a comparison with the average week or month for a series of years; also (in the weekly bulletin) a list of the localities in which smallpox was reported present, which lists, if widely published, would serve to put people intending to visit such places on their guard against the disease.

As a rule, about five-eighths of the card reports reach the office of the State Board of Health in time for compilation in the weekly bulletin, and the monthly bulletins are compiled from the information used in the weekly bulletins. It is found that the statements made in the monthly bulletins are corroborated by the information, after the close of the year, from the compilation of the whole number of the reports for the corresponding months of the year.

The bulletins are an immediate ephemeral use of some of the data supplied by the reports from localities, which data finally go to make up the permanently-valuable sickness statistics, and the communicable-disease statistics in Michigan; but even this ephemeral use has been the means of disseminating among the people of Michigan much information useful for the restriction and prevention of sickness and deaths.

A copy of the weekly bulletin has been sent to such editors as have expressed a desire to have it for use, entire or in part, in their papers; and copies of the monthly bulletin have been sent to the sanitary and medical journals which are received as exchanges by the library of the State Board of Health.

There are about 1,595 cities, villages and townships in Michigan, each of which is required by law to have a health officer, and nearly every one of them contributes some fact, and some of them very many facts, useful for the promotion of the public health. The State Board of Health serves to collect these facts, group them so as to make them most useful, and give them all out again to every locality for the general good.

*Annual compilation of the weekly reports.*—The reports from each locality are compiled by months. The average of the numbers stating the order of prevalence of the several diseases for the month is considered an indication of the actual order of prevalence of the diseases for that time. There is also found for each locality what per cent of the reports states the presence of each disease for the given month. This per cent of reports for a single locality indicates what portion of the month the disease was present in that locality. It may also be called the per cent of weeks the disease was present. These first results of the compilation are stated in Table 3, which, on account of the space required, has not been printed in the reports since that of 1882, but is preserved in the office of the State Board for reference and study.

(Continued after Table 2.)

TABLE 1.—*Stating for each of 11 years, 1893-1903, the number of reports received, and on what per cent of these reports each of 28 diseases was stated to be present; also an average for the period of 10 years, 1893-1902. The diseases are arranged in the order of greatest area of prevalence in 1903. (Continued for each month of 1902 and 1903 on the two pages following.)*

Line number.	Diseases.	What per cent of the reports stated the presence of the disease.											
		Av. 1893-1902.	1903.	1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.
	Av. Disease*.....	18	16	17	18	18	17	17	18	18	20	20	20
1	Rheumatism.....	62	57	59	61	63	63	63	66	60	60	62	64
2	Neuralgia.....	56	49	52	57	56	56	54	58	54	56	56	57
3	Bronchitis.....	50	48	47	50	49	50	49	50	51	52	50	53
4	Tonsillitis.....	44	46	47	46	45	42	40	43	45	43	42	49
5	Influenza.....	43	37	37	44	40	42	45	47	44	44	41	43
6	Diarrhea.....	37	31	33	36	40	37	36	34	34	42	40	40
7	Consumption, pulmonary.....	26	20	20	22	25	22	20	20	23	29	36	38
8	Inflam. of kidney.....	18	19	18	20	20	19	17	17	16	20	17	17
9	Pneumonia.....	19	17	19	20	16	17	17	19	18	21	20	22
10	Puritis.....	16	15	18	17	16	16	15	18	16	17	13	14
11	Scarlet fever.....	10	13	14	14	12	8	5	4	8	12	14	10
12	Typhoid fever (ent.).....	11	13	12	13	15	9	8	7	10	13	11	9
13	Intermittent fever.....	19	12	13	14	16	17	19	17	35	22	23	24
14	Inflam. of bowels.....	11	9	9	9	11	10	10	10	10	11	13	12
15	Measles.....	8	9	10	5	13	6	7	13	7	4	6	7
16	Erysipelas.....	12	8	9	9	10	10	12	14	12	13	13	14
17	Cholera morbus.....	12	8	8	10	14	10	12	10	11	15	14	14
18	Dysentery.....	12	7	7	9	14	13	12	12	11	15	14	13
19	Smallpox.....	2	7	8	7	1	.4	.04	.05	4	.3	.6	.3
20	Whooping-cough.....	8	7	7	5	5	4	5	4	7	9	12	9
21	Remittent fever.....	14	6	7	9	11	12	13	11	16	20	20	18
22	Diphtheria.....	5	6	5	5	4	3	3	5	5	5	7	7
23	Cholera infantum.....	9	5	5	7	12	8	8	8	8	12	12	10
24	Typoh. mal. fever.....	2	2	2	1	3	1	2	.9	2	4	4	4
25	Puerperal fever.....	2	1	1	2	2	2	2	2	2	2	2	3
26	Inflam. of brain.....	2	1	1	.9	1	2	2	2	3	3	3	3
27	Meningitis.....	1	.9	1	1	1	3	2	1	1	.8	1	2
28	Membran. croup.....	1	.4	.5	.4	.4	.6	.5	.7	1	2	2	2
	No. of reports received.....	†5,188	5,647	5,979	5,850	5,513	5,126	5,219	4,418	3,940	4,395	5,572	5,853

\* The numbers opposite the names of the diseases do not state what per cent of the whole number of reports for the year stated the disease to be present at some time during the year, but state (on an average for twelve months of the year) what per cent of reports for the several months stated the disease to be present, in those months. The column for each year is thus a statement for an average month of that year. On the two following pages of this table, however, the columns for each month state what per cent of the reports for that month (the number of which is stated at the foot of the column) stated the given disease to be present in that month.

† Average per year.

TABLE 1.—CONTINUED.—*Stating for each of 28 diseases by months, on what per years 1902 and 1903; also the average by*

What per cent of the reports received stated presence of the disease.												
Line number.	January.				February.				March.			
	Diseases.			Av. 1893-1902.	Diseases.			Av. 1893-1902.	Diseases.			Av. 1893-1902.
	1902.	1903.	1902.		1902.	1903.	1902.		1902.	1903.	1902.	
	Average disease*.....	19	18	19	Average disease*.....	18	19	20	Average disease*.....	20	18	19
1	Rheumatism.....	65	59	63	Influenza.....	73	65	65	Influenza.....	71	69	57
2	Bronchitis.....	61	59	61	Rheumatism.....	65	60	65	Rheumatism.....	68	60	65
3	Tonsillitis.....	55	59	54	Bronchitis.....	63	58	65	Bronchitis.....	62	58	60
4	Influenza.....	68	55	60	Neuralgia.....	54	56	55	Neuralgia.....	64	57	56
5	Neuralgia.....	61	52	61	Neuralgia.....	61	52	59	Tonsillitis.....	52	54	52
6	Pneumonia.....	32	29	32	Pneumonia.....	36	30	35	Pneumonia.....	35	32	32
7	Pleuritis.....	22	20	25	Pleuritis.....	23	20	27	Pleuritis.....	24	19	27
8	Diarrhea.....	22	20	24	Diarrhea.....	20	18	22	Diarrhea.....	22	18	23
9	Inflam. of kidney.....	19	19	23	Inflam. of kidney.....	21	18	26	Scarlet fever.....	11	18	15
10	Consumption, pul.....	25	17	22	Consumption, pul.....	25	18	20	Consumption, pul.....	26	18	20
11	Scarlet fever.....	13	16	22	Scarlet fever.....	12	18	19	Inflam. of kidney.....	20	16	24
12	Smallpox.....	2	15	12	Measles.....	8	14	12	Measles.....	12	13	13
13	Erysipelas.....	12	12	12	Smallpox.....	2	13	13	Smallpox.....	3	10	17
14	Intermittent fev.....	13	11	9	Erysipelas.....	13	12	10	Intermittent fev.....	14	10	10
15	Typhoid fev. (ent.).....	8	11	10	Whooping-cough.....	6	11	6	Erysipelas.....	13	9	8
16	Measles.....	6	11	9	Intermittent fev.....	12	11	11	Whooping-cough.....	6	9	4
17	Whooping-cough.....	6	9	6	Inflam. of bowels.....	9	9	12	Inflam. of bowels.....	10	8	12
18	Inflam. of bowels.....	9	8	10	Remittent fever.....	10	8	6	Typhoid fev. (ent.).....	5	8	7
19	Diphtheria.....	6	6	4	Diphtheria.....	5	7	4	Diphtheria.....	4	5	3
20	Remittent fever.....	11	5	5	Typhoid fev. (ent.).....	6	7	6	Remittent fever.....	10	5	5
21	Puerperal fever.....	3	3	3	Puerperal fever.....	3	3	3	Cholera morbus.....	3	3	2
22	Dysentery.....	4	4	4	Cholera morbus.....	3	3	3	Dysentery.....	4	2	4
23	Inflam. of brain.....	2	2	2	Dysentery.....	4	2	4	Typho-mal. fever.....	1	2	9
24	Cholera morbus.....	2	1	2	Inflam. of brain.....	2	2	2	Inflam. of brain.....	2	1	7
25	Typho-mal. fever.....	2	1	2	Meningitis.....	2	2	2	Puerperal fever.....	3	1	1
26	Meningitis.....	1	1	1	Cholera infantum.....	7	4	9	Cholera infantum.....	6	1	2
27	Membran. croup.....	1	9	5	Typho-mal. fever.....	1	4	1	Meningitis.....	2	2	1
28	Cholera infantum.....	1	4	2	Membran. croup.....	2	2	1	Membran. croup.....	1	0	7
	Reports received†.....	454	453	565	Reports received†.....	402	454	463	Reports received†.....	420	420	426
	April.				May.				June.			
	Diseases.			Av. 1893-1902.	Diseases.			Av. 1893-1902.	Diseases.			Av. 1893-1902.
	1902.	1903.	1902.		1902.	1903.	1902.		1902.	1903.	1902.	
	Average disease*.....	19	17	17	Average disease*.....	17	16	16	Average disease*.....	16	14	14
1	Rheumatism.....	66	58	62	Rheumatism.....	64	59	58	Rheumatism.....	61	57	56
2	Bronchitis.....	60	57	54	Tonsillitis.....	44	43	46	Neuralgia.....	52	43	49
3	Influenza.....	60	55	49	Neuralgia.....	57	47	50	Bronchitis.....	41	40	34
4	Neuralgia.....	61	55	55	Bronchitis.....	50	46	42	Tonsillitis.....	36	38	38
5	Tonsillitis.....	51	49	51	Influenza.....	40	34	31	Diarrhea.....	35	24	30
6	Pneumonia.....	29	30	26	Diarrhea.....	25	23	23	Consumption, pul.....	26	22	19
7	Diarrhea.....	24	20	22	Consumption, pul.....	27	21	19	Influenza.....	25	22	20
8	Inflam. of kidney.....	21	20	20	Measles.....	17	21	17	Measles.....	15	14	16
9	Pleuritis.....	21	18	23	Inflam. of kidney.....	20	20	16	Inflam. of kidney.....	19	14	15
10	Consumption, pul.....	27	15	20	Pneumonia.....	20	20	19	Scarlet fever.....	9	13	10
11	Scarlet fever.....	11	14	13	Scarlet fever.....	10	14	14	Pneumonia.....	11	12	10
12	Measles.....	15	13	17	Intermittent fev.....	19	12	14	Intermittent fev.....	20	11	14
13	Intermittent fev.....	18	12	13	Pleuritis.....	17	12	16	Pleuritis.....	13	10	15
14	Smallpox.....	3	11	14	Erysipelas.....	13	10	9	Inflam. of bowels.....	11	8	8
15	Typhoid fev. (ent.).....	5	10	6	Inflam. of bowels.....	9	9	9	Remittent fever.....	14	7	9
16	Inflam. of bowels.....	10	10	7	Whooping-cough.....	7	9	6	Whooping-cough.....	7	6	8
17	Erysipelas.....	14	10	11	Remittent fever.....	12	8	8	Smallpox.....	2	6	7
18	Whooping-cough.....	6	9	4	Smallpox.....	2	8	11	Typhoid fev. (ent.).....	5	6	9
19	Remittent fever.....	11	6	8	Typhoid fev. (ent.).....	4	6	9	Diphtheria.....	4	6	4
20	Diphtheria.....	3	6	2	Diphtheria.....	4	5	4	Erysipelas.....	12	5	8
21	Inflam. of brain.....	3	1	4	Cholera morbus.....	5	4	3	Cholera morbus.....	11	5	8
22	Cholera morbus.....	3	1	9	Cholera infantum.....	2	2	2	Cholera infantum.....	7	3	2
23	Dysentery.....	4	1	3	Dysentery.....	4	2	3	Inflam. of brain.....	2	2	1
24	Meningitis.....	2	1	3	Typho-mal. fever.....	9	1	4	Dysentery.....	7	2	1
25	Cholera infantum.....	1	5	9	Inflam. of brain.....	2	1	2	Typho-mal. fever.....	3	2	1
26	Typho-mal. fever.....	9	5	0	Meningitis.....	3	1	3	Meningitis.....	1	1	4
27	Puerperal fever.....	3	5	1	Puerperal fever.....	3	1	1	Puerperal fever.....	1	1	4
28	Membran. croup.....	1	2	0	Membran. croup.....	1	5	4	Membran. croup.....	5	2	7
	Reports received†.....	354	420	451	Reports received†.....	450	414	477	Reports received†.....	435	465	451

\* This note is on the preceding page.

† The numbers in this line  
† Statements in this exhibit for months in 1903, are



Cent of the reports received the diseases were stated to be present in each of the months for the period of 10 years, 1893-1902.

What per cent of the reports received stated presence of the disease.

July.				August.				September.				Line number.
Diseases.	Av. 1893-1902.	1903.†	1902.	Diseases.	Av. 1893-1902.	1903.†	1902.	Diseases.	Av. 1893-1902.	1903.†	1902.	
Average disease*.....	17	14	15	Average disease*.....	18	16	16	Average disease*.....	18	17	17	
Rheumatism.....	58	52	55	Diarrhea.....	68	55	57	Diarrhea.....	68	57	57	1
Neuralgia.....	48	43	44	Rheumatism.....	56	51	57	Rheumatism.....	58	55	59	2
Diarrhea.....	53	41	48	Neuralgia.....	48	46	47	Neuralgia.....	50	43	49	3
Tonsillitis.....	33	38	37	Bronchitis.....	35	39	32	Bronchitis.....	41	41	43	4
Bronchitis.....	34	36	31	Tonsillitis.....	33	38	35	Tonsillitis.....	34	37	41	5
Consumption, pul.....	26	21	19	Dysentery.....	32	21	18	Consumption, pul.....	25	22	19	6
Inflam. of kidney.....	17	19	13	Cholera morbus.....	34	21	27	Cholera morbus.....	31	21	17	7
Influenza.....	17	16	15	Cholera infantum.....	30	19	21	Dysentery.....	33	21	16	8
Intermittent fev.....	21	16	15	Consumption, pul.....	25	18	19	Typhoid fev. (ent.).....	20	21	21	9
Cholera morbus.....	25	13	18	Influenza.....	17	18	16	Cholera infantum.....	29	18	17	10
Pleuritis.....	11	12	10	Typhoid fev. (ent.).....	15	17	15	Influenza.....	24	18	25	11
Measles.....	9	10	11	Inflam. of kidney.....	15	17	15	Inflam. of kidney.....	16	17	18	12
Inflam. of bowels.....	12	10	8	Intermittent fev.....	23	15	15	Pleuritis.....	10	15	10	13
Typhoid fev. (ent.).....	8	9	10	Pleuritis.....	13	8	8	Intermittent fev.....	24	14	15	14
Scarlet fever.....	7	8	9	Inflam. of bowels.....	16	12	11	Inflam. of bowels.....	14	12	12	15
Dysentery.....	18	8	9	Scarlet fever.....	7	11	13	Scarlet fever.....	8	10	9	16
Cholera infantum.....	18	8	12	Erysipelas.....	9	8	7	Remittent fever.....	19	8	8	17
Pneumonia.....	6	7	9	Whooping-cough.....	7	8	7	Pneumonia.....	7	7	9	18
Whooping-cough.....	8	7	9	Remittent fever.....	17	7	10	Whooping-cough.....	7	5	8	19
Remittent fever.....	15	6	6	Smallpox.....	1	6	4	Diphtheria.....	4	5	4	20
Erysipelas.....	11	6	10	Diphtheria.....	3	5	2	Smallpox.....	7	5	2	21
Smallpox.....	1	5	5	Pneumonia.....	5	5	4	Erysipelas.....	9	5	6	22
Diphtheria.....	3	4	3	Measles.....	4	4	3	Typho-mal fever.....	5	2	3	23
Puerperal fever.....	2	2	8	Puerperal fever.....	2	2	1	Inflam. of brain.....	2	2	1	24
Inflam. of brain.....	2	2	2	Inflam. of brain.....	2	2	8	Meningitis.....	2	1	1	25
Meningitis.....	1	8	2	Typho-mal fever.....	4	1	2	Puerperal fever.....	2	1	2	26
Typho-mal fever.....	3	6	2	Meningitis.....	1	6	1	Measles.....	3	3	4	27
Membran. croup.....	4	2	0	Membran. croup.....	3	6	2	Membran. croup.....	4	2	4	28
Reports received†.....	465	529	628	Reports received†.....	475	483	480	Reports received†.....	433	591	476	
October.				November.				December.				
Diseases.	Av. 1893-1902.	1903.†	1902.	Diseases.	Av. 1893-1902.	1903.†	1902.	Diseases.	Av. 1893-1902.	1903.†	1902.	
Average disease*.....	18	16	16	Average disease*.....	18	15	16	Average disease*.....	18	16	18	
Rheumatism.....	61	59	57	Rheumatism.....	63	56	57	Rheumatism.....	63	57	59	1
Neuralgia.....	55	52	51	Bronchitis.....	54	49	50	Neuralgia.....	57	53	34	2
Tonsillitis.....	41	43	46	Tonsillitis.....	49	48	52	Bronchitis.....	58	53	55	3
Diarrhea.....	48	43	37	Neuralgia.....	57	45	51	Tonsillitis.....	53	53	56	4
Bronchitis.....	47	42	45	Influenza.....	43	34	37	Influenza.....	57	46	49	5
Influenza.....	29	25	26	Diarrhea.....	28	25	27	Inflam. of kidney.....	17	24	17	6
Consumption, pul.....	24	22	21	Consumption, pul.....	24	22	20	Consumption, pul.....	23	21	19	7
Typhoid fev. (ent.).....	22	21	19	Inflam. of kidney.....	19	21	16	Pneumonia.....	23	21	27	8
Inflam. of kidney.....	16	18	15	Typhoid fev. (ent.).....	18	18	14	Pleuritis.....	19	21	23	9
Intermittent fev.....	23	16	16	Pleuritis.....	16	15	16	Diarrhea.....	23	20	25	10
Dysentery.....	19	14	8	Pneumonia.....	18	14	20	Scarlet fever.....	13	16	16	11
Scarlet fever.....	10	13	13	Scarlet fever.....	12	12	13	Typhoid fev. (ent.).....	12	15	14	12
Cholera morbus.....	13	11	7	Intermittent fev.....	19	10	13	Intermittent fev.....	14	10	10	13
Pleuritis.....	12	11	12	Diphtheria.....	8	8	7	Erysipelas.....	14	9	13	14
Pneumonia.....	10	10	10	Erysipelas.....	11	8	9	Diphtheria.....	7	8	7	15
Inflam. of bowels.....	11	9	8	Inflam. of bowels.....	8	7	8	Inflam. of bowels.....	9	6	10	16
Remittent fever.....	18	8	8	Cholera morbus.....	15	5	6	Remittent fever.....	12	4	5	17
Diphtheria.....	7	8	9	Cholera infantum.....	4	4	4	Measles.....	5	4	9	18
Cholera infantum.....	11	6	5	Dysentery.....	6	4	2	Smallpox.....	2	4	9	19
Erysipelas.....	10	5	9	Whooping-cough.....	6	4	7	Whooping-cough.....	7	3	9	20
Typho-mal fever.....	5	4	2	Smallpox.....	4	3	4	Dysentery.....	3	2	3	21
Whooping-cough.....	5	3	1	Measles.....	3	2	6	Cholera infantum.....	6	2	4	22
Meningitis.....	1	1	1	Smallpox.....	2	2	3	Typho-mal fever.....	2	2	1	23
Measles.....	2	1	4	Membran. croup.....	2	1	4	Meningitis.....	1	2	1	24
Smallpox.....	7	9	1	Inflam. of brain.....	2	9	2	Inflam. of brain.....	2	1	1	25
Puerperal fever.....	2	6	1	Cholera infantum.....	1	7	7	Puerperal fever.....	2	8	7	26
Membran. croup.....	1	6	4	Puerperal fever.....	2	7	7	Cholera morbus.....	3	6	3	27
Inflam. of brain.....	2	4	2	Meningitis.....	9	0	1	Membran. croup.....	1	2	9	28
Reports received†.....	456	466	570	Reports received†.....	428	427	455	Reports received†.....	415	526	537	

state how many reports were received for the month in the given years. graphically represented in Diagrams 1 to 5, in this article.



# STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1904.

Table 2.—By months and by geographical divisions of the State,\* the names of 212 observers, whose weekly reports of diseases for 1903 are compiled in Tables 1 to 17 in this article, localities for which they report, and the number of reports received from each observer.

Divisions and localities represented and physicians who reported.  (Voluntary observers in italics.)	Weekly reports in 1903.—Compiled in this article.												
	Year 1903.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Localities.....	5,647	453	454	420	420	414	465	528	483	591	466	427	526
<hr/>													
Upper Peninsula Division.....	272	22	13	21	20	19	25	22	26	27	22	22	23
Bessemer, E. H. Madajsky, M. D.....	23	4	4	4	.....	.....	.....	.....	.....	.....	.....	.....	3
Crystal Falls, R. H. Darling, M. D.....	12	.....	.....	.....	.....	.....	.....	.....	3	3	.....	.....	.....
Ishpeming, W. S. Picotte, M. D.....	51	4	3	4	5	4	4	5	4	5	4	4	5
Menominee, P. J. Noer, M. D.....	17	4	4	4	5	.....	.....	.....	.....	.....	.....	.....	.....
Negaunee, H. S. Smith, M. D.....	23	.....	.....	.....	.....	.....	.....	3	5	4	4	5	.....
Norway, B. W. Jones, M. D.....	14	.....	.....	.....	.....	.....	3	3	.....	.....	.....	3	5
Ontonagon, J. S. Nitterauer, M. D.....	36	2	.....	2	5	4	4	4	4	4	4	3	.....
St. Ignace, J. F. Darby, M. D.....	10	4	3	3	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Ignace, J. A. Knight, M. D.....	34	.....	.....	.....	.....	3	4	5	4	5	4	4	5
Wakefield, J. H. Eddy, M. D.....	52	4	4	4	5	4	4	5	4	5	4	4	5
<hr/>													
Northwestern Division.....	268	20	23	21	20	19	18	25	22	30	23	21	26
Bear Lake, C. A. Noroink, M. D.....	47	2	3	4	4	3	4	5	4	5	4	4	5
Fife Lake, L. S. Walter, M. D.....	46	3	4	3	4	4	3	5	4	4	4	4	3
Manistee, J. A. King, M. D.....	15	4	4	4	3	.....	.....	.....	.....	.....	.....	.....	.....
Manistee, A. S. Payne, M. D.....	34	.....	.....	.....	.....	4	4	5	4	5	3	4	5
Mesick, C. D. Woodruff, M. D.....	19	.....	.....	.....	.....	.....	.....	2	5	4	3	5	.....
Sutton's Bay, E. C. Van de Walker, M. D.....	41	3	4	4	.....	4	3	5	4	5	4	2	3
Thompsonville, R. McDermott, M. D.....	14	4	4	2	4	.....	.....	.....	.....	.....	.....	.....	.....
Traverse City, F. P. Lawton, M. D.....	19	4	4	4	5	2	.....	.....	.....	.....	.....	.....	.....
Traverse City, J. A. Thompson, M. D.....	33	.....	.....	.....	.....	2	4	5	4	5	4	4	5
<hr/>													
Northern Division.....	257	23	22	23	18	19	25	22	17	27	24	16	21
Bellaire, A. T. Bodie, M. D.....	12	4	4	4	.....	.....	.....	.....	.....	.....	.....	.....	.....
Boyne Falls, A. N. Howe, M. D.....	8	.....	.....	.....	.....	4	4	.....	.....	.....	.....	.....	.....
Central Lake, F. P. Ramsey, M. D.....	21	.....	.....	.....	.....	2	2	3	2	3	3	2	4
Charlevoix, R. B. Armstrong, M. D.....	51	4	4	4	5	4	4	5	4	5	4	4	4
Cheboygan, W. F. Reed, M. D.....	52	4	4	4	5	4	4	5	4	5	4	4	5
East Jordan, F. C. Warne, M. D.....	32	4	4	4	5	3	2	.....	5	2	.....	.....	3
Gaylord, E. L. Ford, M. D.....	22	.....	.....	.....	.....	2	4	4	3	4	3	2	.....
Kalkaska, P. W. Pearsall, M. D.....	16	4	4	4	.....	.....	.....	.....	.....	.....	4	.....	.....
Kalkaska, E. J. Hill, M. D.....	3	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	.....	.....
Petoskey, H. T. Calkins, M. D.....	29	.....	.....	.....	.....	2	5	4	5	4	4	4	5
Vanderbilt, W. H. Marshall, M. D.....	11	3	2	3	3	.....	.....	.....	.....	.....	.....	.....	.....
<hr/>													
Northeastern Division.....	52	4	4	4	5	4	4	5	4	5	4	4	5
Harrisville, D. W. Mitchell, M. D.....	52	4	4	4	5	4	4	5	4	5	4	4	5
<hr/>													
Western Division.....	575	48	52	47	42	41	44	54	48	57	47	42	53
Cedar Springs, C. W. Brayton, M. D.....	13	.....	.....	.....	.....	2	3	5	3	.....	.....	.....	.....
Custer, A. D. Kibbie, M. D.....	49	3	4	4	5	4	4	5	3	4	4	4	5
Grand Haven, W. S. Waikley, M. D.....	14	2	4	4	4	.....	.....	.....	.....	.....	.....	.....	.....
Grand Haven, J. N. Reynolds, M. D.....	11	.....	.....	.....	.....	3	4	4	.....	.....	.....	.....	.....
Grand Haven, John T. Cooper, M. D.....	21	.....	.....	.....	.....	.....	.....	3	5	4	4	4	5
Grandville, L. G. Wedgewood, M. D.....	24	.....	.....	.....	.....	3	4	5	4	4	4	.....	.....
Holland, B. B. Godfrey, M. D.....	35	4	4	4	.....	3	2	.....	3	4	3	4	4
Lowell, O. C. McDannell, M. D.....	52	4	4	4	5	4	4	5	4	5	4	4	5
Ludington, E. F. Atwood, M. D.....	15	4	4	3	4	.....	.....	.....	.....	.....	.....	.....	.....
Ludington, H. M. Best, M. D.....	32	.....	.....	.....	.....	3	4	5	4	5	4	3	4
Muskegon, Jacob Osting, M. D.....	34	.....	.....	.....	.....	3	4	5	4	5	4	4	5
Muskegon, J. F. Denalow, M. D.....	16	4	4	4	4	.....	.....	.....	.....	.....	.....	.....	.....
Muskegon Heights, R. G. Olson, M. D.....	52	4	4	4	5	4	4	5	4	5	4	4	5
Rockford, H. O. Sarber, M. D.....	51	4	4	4	5	4	3	5	4	5	4	4	5
Sand Lake, A. R. Hicks, M. D.....	7	3	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Scottville, E. P. Thomas, M. D.....	52	4	4	4	5	4	4	5	4	5	4	4	5
Sparta, J. Gillett, M. D.....	12	4	4	4	.....	.....	.....	.....	.....	.....	.....	.....	.....
White Cloud, W. C. Derby, M. D.....	52	4	4	4	5	4	4	5	4	5	4	4	5
Whitehall, L. W. Keys, M. D.....	12	4	4	4	.....	.....	.....	.....	.....	.....	.....	.....	.....
Whitehall, V. A. Chapman, M. D.....	21	.....	.....	.....	.....	.....	.....	.....	4	5	4	3	5

\* The counties in each division are shown on maps of the State, on pages 201 and 217 of the report of this Board for 1896.

a In many cases the reports include sickness in the vicinity as well as the corporate limits of the places named.

## STATISTICAL STUDY OF SICKNESS IN MICHIGAN IN 1903.

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TABLE 2.—CONTINUED.

Divisions and localities represented and physicians who reported.  (Voluntary observers in italics.)	Weekly reports in 1903.—Compiled in this article.												
	Year 1903.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Northern Central Division.....	270	27	24	19	21	14	21	30	24	40	17	15	13
Big Rapids, W. A. Whitney, M. D.....	27	4	2	3	3	2	3	3	3	5	2	4	5
Clair, J. A. Reeder, M. D.....	51	4	4	4	5	3	4	5	4	5	4	4	4
Evart, J. M. Wilkinson, M. D.....	18	3	2	2	4	3	3	4	3	3	2	4	4
Farwell, L. L. Kelly, M. D.....	30	3	2	2	4	3	3	5	3	3	2	4	4
Gladwin, J. W. Leininger, M. D.....	17	4	4	4	5	3	3	5	3	5	3	3	5
Gladwin, C. G. Suylandt, M. D.....	25	4	4	2	4	2	3	5	3	5	2	4	4
Lake City, D. J. Erwin, M. D.....	25	4	4	4	4	2	3	3	4	5	4	4	4
Midbain, S. D. Yerington, M. D.....	7	4	4	4	4	4	4	5	4	5	4	4	4
Midland, W. H. Brock, M. D.....	28	4	4	4	4	2	3	3	4	5	4	4	4
Reed City, A. W. Miller, M. D.....	34	4	4	4	4	4	4	5	4	5	4	4	4
Rosecommon, J. H. Curnalia, M. D.....	8	4	4	4	4	4	4	5	4	5	4	4	4
Bay and Eastern Division.....	305	65	64	59	70	59	62	76	61	82	69	60	72
Almont, D. H. Burley, M. D.....	51	4	4	4	5	4	4	4	4	5	4	4	5
Applegate, J. C. McBean, M. D.....	14	4	4	4	4	4	4	4	2	3	3	2	4
Brown City, J. W. Weed, M. D.....	12	2	2	4	4	4	3	2	2	3	4	4	3
Cass City, D. P. Deming, M. D.....	51	4	3	4	5	4	4	5	4	5	4	4	5
Crowell, H. H. Learmont, M. D.....	12	4	4	4	4	4	4	4	4	5	4	4	4
Crowell, T. S. Kingston, M. D.....	35	4	4	4	5	4	4	5	4	5	4	4	5
Deekerville, G. C. Vincent, M. D.....	52	4	4	4	5	4	4	5	4	5	4	4	5
Dryden, I. E. Parker, M. D.....	47	4	4	4	5	4	4	4	4	5	4	4	5
Emmett, J. L. Chester, M. D.....	33	2	2	4	5	4	3	4	4	5	4	4	4
Forestville, A. Stephens, M. D.....	50	2	4	4	5	4	4	5	4	5	4	4	5
Harbor Beach, P. O. Wagener, M. D.....	17	4	4	4	4	4	4	4	2	3	3	4	4
Lexington, W. J. Foster, M. D.....	49	4	4	4	5	4	3	4	4	5	4	4	4
Mayville, R. C. Buck, M. D.....	6	4	2	4	4	4	4	4	4	4	4	4	4
Oakley, T. H. O'Rourke, M. D.....	8	4	4	4	4	4	4	4	4	4	4	4	4
Peek, L. E. Cochran, M. D.....	13	4	4	4	4	4	4	4	4	4	4	4	4
Port Austin, R. J. Smith, M. D.....	49	3	4	4	5	4	4	4	4	5	4	4	5
Port Huron, A. H. Cote, M. D.....	20	4	4	4	4	4	2	3	4	5	4	4	4
Port Sanilac, A. W. Campbell, M. D.....	4	4	4	4	4	4	4	4	4	4	4	4	4
Port Sanilac, J. W. Loop, M. D.....	21	4	4	4	4	3	4	5	4	5	4	4	5
Reese, J. MacKenzie, M. D.....	52	4	4	4	5	4	4	5	4	5	4	4	5
St. Charles, J. C. Vollmar, M. D.....	32	4	4	4	5	3	4	4	3	5	4	4	5
St. Charles, C. M. Bradt, M. D.....	51	4	4	4	5	3	4	5	4	5	4	4	5
Sanilac Center, J. W. Scott, M. D.....	37	4	4	3	5	3	3	3	4	5	4	3	5
Sebewaing, B. Friedlander, M. D.....	16	4	3	4	5	4	4	4	4	4	4	4	4
West Bay City, A. F. Hagadorn, M. D.....	22	4	4	4	5	3	2	5	4	5	4	4	4
Yale, B. F. Codrington, M. D.....	51	4	4	4	5	4	4	5	4	5	4	4	4
Central Division.....	1,108	78	78	75	58	79	91	113	110	123	98	92	113
Alma, I. N. Brainard, M. D.....	11	4	3	4	4	4	4	4	4	5	3	4	3
Alma, E. T. Lamb, M. D.....	31	4	4	4	4	4	4	4	4	5	3	4	3
Bancroft, T. N. Yeomans, M. D.....	23	3	2	3	4	3	3	3	4	4	3	2	4
Belding, I. Ohlinger, M. D.....	14	4	4	2	4	4	4	4	4	4	4	4	4
Belding, W. Andrew, Dutt, M. D.....	25	4	4	4	4	4	3	3	3	5	3	4	4
Charlotte, A. R. Stealy, M. D.....	7	4	3	4	4	4	4	4	4	4	4	4	4
Charlotte, W. H. Rand, M. D.....	18	4	4	4	4	4	4	4	4	4	4	4	4
Clio, P. B. Taylor, M. D.....	18	3	3	2	4	2	3	3	2	4	4	4	3
Eaton Rapids, A. E. West, M. D.....	7	4	4	4	4	2	2	3	2	4	4	4	3
Edmore, J. Purdon, M. D.....	9	4	4	4	4	2	2	3	2	4	4	4	3
Elsie, G. H. Beal, M. D.....	31	4	4	4	4	4	4	5	4	5	4	4	5
Elsie, D. F. Brown, M. D.....	11	4	4	3	4	4	4	4	4	4	4	4	4
Fenton, A. G. Wright, M. D.....	7	3	4	4	4	4	4	4	4	4	4	4	4
Fenton, B. C. McGarry, M. D.....	33	4	4	4	4	3	3	5	4	5	4	4	5
Flint, N. Bates, M. D.....	33	4	4	4	5	4	4	4	4	4	4	4	5
Flushing, C. S. Wheeler, M. D.....	52	4	4	4	5	4	4	4	4	5	4	4	5
Gaines, H. C. Switzer, M. D.....	32	4	4	4	4	4	4	4	4	4	4	3	5
Grand Ledge, W. A. Davis, M. D.....	22	4	4	4	4	4	4	4	4	4	4	4	5
Greenville, C. O. Jenison, M. D.....	40	4	4	4	5	4	4	4	3	5	4	4	4
Hastings, E. H. Lathrop, M. D.....	26	4	4	4	4	3	2	3	3	5	4	2	4
Howard City, J. O. Nelson, M. D.....	34	4	4	4	4	4	4	5	4	5	4	4	4
Howell, R. H. Baird, M. D.....	18	4	4	4	4	4	4	4	4	4	3	3	4
Ionia, J. G. Conner, M. D.....	50	4	4	4	5	4	3	5	4	5	4	3	5
Lake Odessa, H. C. Carpenter, M. D.....	6	4	4	4	4	4	4	4	3	3	3	4	4
Lansing, C. D. Black, M. D.....	49	4	3	4	4	4	4	5	4	5	3	4	5
Linden, H. H. Chase, M. D.....	43	4	4	3	4	4	4	4	4	5	4	3	3
Morrice, W. Shaw, M. D.....	48	4	4	3	4	4	3	5	4	5	4	4	5
Mt. Morris, H. W. Graham, M. D.....	50	4	4	4	5	4	4	4	4	5	3	4	5
Ovid, J. E. Taylor, M. D.....	15	3	3	4	5	4	4	4	4	5	4	4	5
Ovid, O. B. Campbell, M. D.....	52	4	4	4	5	4	4	5	4	5	4	4	5

TABLE 2.—CONTINUED.

Weekly reports in 1903.—Compiled in this article.

Divisions and localities represented and  
physicians who reported.

(Voluntary observers in italics.)

Central Division—Continued.

Year 1903.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Owosso, T. B. Scott, M. D.	28					4	5	3	4	4	3	5
Perry, L. M. Cudworth, M. D.	10	3	3	4								
Perry, H. W. Cobb, M. D.	38				3	4	4	5	4	5	4	5
Pewamo, J. R. Hay, M. D.	9	4	2	3								
Portland, D. McClurg, M. D.	35											
Pottersville, L. E. Higbee, M. D.	12	4	4	4		4	5	4	5	4	4	
St. Johns, H. D. Squair, M. D.	20					2	3	4	4			3
Saranac, C. G. Johnson, M. D.	9					3				3	3	
Sheridan, L. C. Jacobson, M. D.	21							4	5	4	4	4
Stanton, N. E. Bachman, M. D.	5				2		3					
Stockbridge, H. D. Brown, M. D.	8							3	3		2	
Stockbridge, G. A. Rowe, M. D.	12	4	4	4								
Sunfield, T. L. Peacock, M. D.	11					4	5	2		4		
Vermontville, Frank H. Snell, M. D.	38			3	4	4	5	4	5	4	4	5
Vernon, W. H. Holtzman, M. D.	21	4	4	4					3	3		3
Vernon, L. F. Fleckenstein, M. D.	16				4	4	4	4				

Southwestern Division.

Year 1903.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
Benton Harbor, R. B. Taber, M. D.	580	54	53	45	48	43	46	44	55	64	46	37	45
Berrien Springs, W. F. Bullard, M. D.	14								2	3	2	3	4
Douglas, H. A. Stroud, M. D.	45	4	4	4	5	4	4	5	4	5	4	2	
Dowagiac, W. E. Parker, M. D.	12	4	4	4									
Dowagiac, C. M. Myers, M. D.	12	3	2	2	5								
Eau Claire, J. H. Herring, M. D.	11					3			3	3	2		
Galien, F. O. Higbee, M. D.	30					4	4		4	5	4	4	5
Gableville, J. J. Carpenter, M. D.	23	2				4	4	4	4	5			
Hartford, W. R. Sober, M. D.	10								4	3			3
Lawton, I. E. Hamilton, M. D.	12	4	4	4									
New Buffalo, B. O. Ericsson, M. D.	24	4	4	4				4	4	4	4	4	
Niles, J. D. Greenamyer, M. D.	50	4	4	3	4	4	4	5	4	5	4	4	5
Otsego, M. Chase, M. D.	48	4	4	4	5	4	4	5	2	3	4	4	5
Paw Paw, C. S. Maynard, M. D.	47	2	4	4	5	4	3	5	4	3	4	4	5
Plainwell, C. M. Stuck, M. D.	51	4	4	4	5	4	4	5	4	4	4	4	5
South Haven, M. E. Bishop, M. D.	6	3	3										
Three Oaks, R. C. Knox, M. D.	52	4	4	4	5	4	4	5	4	5	4	4	5
Three Oaks, W. L. Helkie, M. D.	12	4	4	4									
Vandalia, O. J. East, M. D.	30					2	4	5	4	5	4	2	4
Vandalia, O. J. East, M. D.	41	4	4	4	5	4	4	5	4	4	3		
Watervliet, F. W. Brown, M. D.	39	4	4	4	4	2	4	4	4	4	3	2	4
Wayland, E. O. Hanlon, M. D.	11				5		3			3			

Southern Central Division.

Year 1903.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
Albion, G. C. Hafford, M. D.	979	74	76	74	78	76	85	95	74	90	81	80	98
Albion, I. C. Foster, M. D.	17	4	4	4	5								
Augusta, C. E. Doyle, M. D.	34					4	4	4	4	5	4	4	5
Bronson, J. E. Outwater, M. D.	47	4	4	4	5	4	4	4	2	5	4	2	5
Burlington, E. C. Derickson, M. D.	49	2	4	4	5	4	4	4	4	5	4	4	5
Camden, J. A. Bates, M. D.	33					2	4	5	4	5	4	4	5
Chelsea, Geo. W. Palmer, M. D.	12	4	4	4									
Chelsea, Geo. W. Palmer, M. D.	20								2	5	4	4	5
Clayton, J. E. McDonald, M. D.	51	4	4	4	5	4	4	5	3	5	4	4	5
Climax, A. M. Haight, M. D.	9	3	2	4	4								
Clinton, J. L. Tuttle, M. D.	32	3	2	4	3	2	2	3			4	4	5
Concord, J. L. Parmeter, M. D.	12	4	4	4									
Concord, T. R. Hungeford, M. D.	19				3	4	4	5	3				
Constantine, E. J. Brady, M. D.	5	3		2									
Constantine, E. P. Partlow, M. D.	35					4	4	5	4	5	4	4	5
Centerville, A. F. Kingsley, M. D.	11										2	4	5
Deerfield, W. Bliss, M. D.	10	4	3										
Dexter, W. C. Wylie, M. D.	5				3								
Galesburg, W. A. Burdick, M. D.	7	2	3	2									
Grass Lake, W. D. Lyon, M. D.	52	4	4	4	5	4	4	5	4	5	4	4	5
Hanover, E. M. Vardon, M. D.	8												
Hanover, F. E. Wilson, M. D.	34					4	4	5	4	4	4	4	5
Hillsdale, S. B. Frankhauser, M. D.	45	4	4	3	5	4	4	5	3	5	2	2	4
Hudson, M. B. Prentice, M. D.	11	3	2	2	4								
Hudson, F. H. Nelson, M. D.	21					4	4	4	2	4	2	2	4
Jackson, J. T. Main, M. D.	43					4	4	3	2	2	4	3	4
Kalamazoo, R. P. Beebe, M. D.	33	2	4	4	5	2	4	5	4	5	4	4	5
Marshall, L. S. Joy, M. D.	30						4	5	4	5	4	4	4
Marshall, E. J. Marshall, M. D.	11	3	4	4									
Mendon, C. E. Barninger, M. D.	31	2	2	2		4	4	3	3	3	3	2	3
Milan, A. G. Mesic, M. D.	6	4	2										



TABLE 2.—CONCLUDED.

Divisions and localities represented and physicians who reported.  (Voluntary observers in italics.)	Weekly reports in 1903.—Compiled in this article.												
	Year 1903.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Southern Central Division—Continued.													
Morenci, C. W. Stocum, M. D.	33					2	4	5	4	5	4	4	5
Sturgis, T. O. Potter, M. D.	9						2	3			2	2	
Tecumseh, <i>J. F. Jenkins, M. D.</i>	43	3	4	3	3	4	3	4	3	5	3	3	5
Three Rivers, W. E. Clark, M. D.	11				4	2	2		3				
Union City, W. C. Henderson, M. D.	38				3	4	4	5	4	5	4	4	5
Waldron, <i>C. Bates, M. D.</i>	19	4	4	4	5	2							
White Pigeon, E. C. Dunning, M. D.	41	4	4	3	4	4	4	3	4		4	4	3
Ypsilanti, C. R. Wilcoxson, M. D.	52	4	4	4	5	4	4	5	4	5	4	4	5
Southeastern Division.													
Armada, E. E. Evans, M. D.	481	38	40	32	42	41	44	42	42	40	35	38	47
Armada, Burton Hodges, M. D.	12	4	4	4									
Delray, A. I. Burdeno, M. D.	5					2			3				
Delray, B. G. Monkman, M. D.	4					4							
Dundee, A. E. Unger, M. D.	8	2	4	2									
Dundee, E. E. Richardson, M. D.	16	3	3	3	5		2				2		
Farmington, J. A. Miller, M. D.	26						2	4	4	4	3	4	5
Frazer, F. Grover, M. D.	8						4		2				
Highland Park, H. W. Scott, M. D.	25	3	2		3	2		5	2			4	4
Maybee, H. Creasey, M. D.	48	4	4	4	5	4	4	5	3	4	4	4	3
Memphis, E. D. Mills, M. D.	52	4	4	4	5	4	4	5	4	5	4	4	5
Ortonville, E. B. Guile, M. D.	15					4	2	3	3				3
Ortonville, M. J. Uloth, M. D.	15	4	4	4	3								
Petersburg, R. R. Kirby, M. D.	9					4	3		2				
Plymouth, F. B. Adams, M. D.	25						3	5	3	4	4	2	4
Richmond, F. T. Fenton, M. D.	51	4	4	3	5	4	4	5	4	5	4	4	5
Romeo, W. Greenshields, M. D.	52	4	4	4	5	4	4	5	4	5	4	4	5
Warren, J. C. Flynn, M. D.	23	3	3		3	2	3			3	3		3
Woodmere, T. Schmalzriedt, M. D.	31				3	3	3		4	5	4	4	5
Wyandotte, A. W. Brighton, M. D.	50	3	4	4	5	4	4	5	4	5	3	4	5
	6						2					4	

A combination of the statements for localities in Table 3, is made by months for the State, so far as it is represented by the localities from which reports are received, showing: (1) What per cent of the observers reported each disease each month; (2) for the localities at which a given disease was reported, an average of the per cent of weeks it was reported at those localities; (3) what per cent of all the reports received for the month stated the presence of each disease; (4) an average of the numbers denoting the order of prevalence of each disease at the localities at which it was reported present during the month.

*Diseases from which there was a marked increase or decrease in prevalence in Michigan in 1903.*—By referring to Tables 13 and 14, on subsequent pages, it will be seen that the diseases which showed a marked increase in 1903 over the average for the ten years, 1893–1902, are scarlet fever, smallpox, and diphtheria; the diseases in which the decrease in 1903 appears most marked, when compared with the above mentioned average, are intermittent fever, remittent fever, consumption, erysipelas, cholera infantum, cholera morbus, dysentery, puerperal fever, inflammation of brain, membranous croup and meningitis.

The lessened prevalence, in recent years, of some of the dangerous communicable diseases, as shown in the diagrams on pages 3 and 4 of the annual report of this Board for 1901, was undoubtedly due to the persistent efforts of the State Board of Health, with the co-operation of local health officers in the State, for the education of the people in the prompt and thorough isolation of infected persons and those who may have been exposed to a dan-



gerous communicable disease, and the subsequent disinfection, after recovery, or death, of all infected articles.

*Method of comparison of diseases by years, months, and weeks.*—In the annual reports ending with that for 1888, mention was made of diseases in which a difference of seven or more was shown between the per cents of reports stating the presence of the disease in the current year and in the preceding year or term of years; in the reports since that for 1888 those diseases were mentioned of which the comparison showed an increase or decrease of twenty-five per cent from the preceding year, or from the normal, as the case may be.

In this report, those diseases which are reported by seven or more observers, and which show an increase or decrease of twenty-five per cent, are generally mentioned, except in cases of cholera, smallpox, typhus fever or other particularly interesting or dangerous disease, and these are specially considered in each instance.

DIAGRAM I.—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1903.

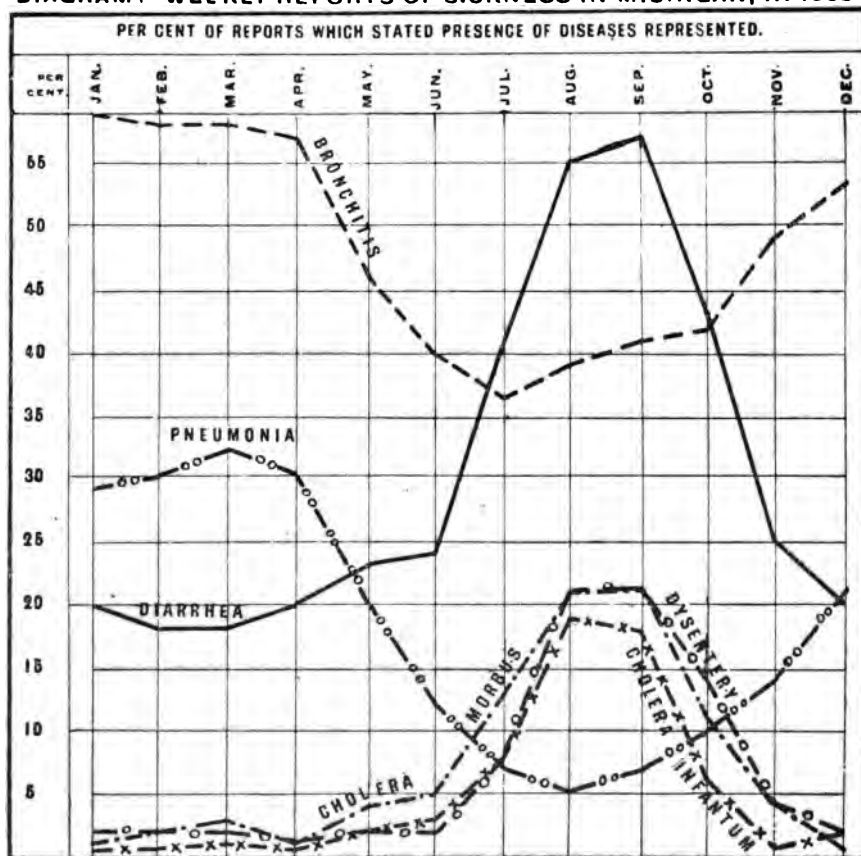


TABLE 4.\*—*Stating for each of 11 years, 1893-1903, the number and per cent of observers by whom the following diseases were reported present; also an average for the period of 10 years, 1893-1902. The diseases are arranged in order of greatest number of observers who reported them present in 1903.† (Continued for each month of 1902 and 1903 on the two pages following.)*

Line number.	Diseases.	Observers by whom the several diseases were reported present—average per cents (per month) of those making reports.‡											
		Av.1893-1903.	1903.	1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.
	Average for tabulated diseases reported present.... }	27	25	25	26	28	26	26	27	21	30	30	31
1	Rheumatism .....	77	70	73	74	76	74	76	81	78	78	78	80
2	Tonsillitis .....	66	67	66	66	65	63	60	64	70	66	64	71
3	Neuralgia.....	72	64	67	71	72	69	70	74	74	74	74	76
4	Bronchitis.....	66	60	62	64	64	64	65	66	70	69	67	72
5	Influenza.....	56	50	49	56	54	53	59	61	59	58	55	57
6	Diarrhea.....	56	48	52	54	59	55	55	53	55	60	58	61
7	Pneumonia.....	34	30	35	35	30	31	33	36	34	36	36	37
8	Inflam. of kidney.....	31	29	30	31	34	30	29	30	29	33	31	29
9	Pleuritis.....	30	27	31	31	30	30	29	30	32	32	28	27
10	Consumption, pul.....	31	25	25	27	30	28	25	25	29	35	43	47
11	Intermittent fever.....	30	21	23	23	27	28	32	27	31	35	36	37
12	Scarlet fever.....	17	21	23	21	21	14	9	8	14	19	24	19
13	Typhoid fever (ent.).....	17	20	18	20	22	14	14	11	16	21	18	15
14	Inflam. of bowels.....	23	18	20	20	24	21	24	24	23	25	27	25
15	Erysipelas.....	24	17	17	18	20	20	25	27	26	28	27	29
16	Cholera morbus.....	23	16	16	19	25	19	23	21	23	26	27	26
17	Measles.....	14	16	16	9	23	12	12	22	12	8	11	14
18	Dysentery.....	24	15	16	19	28	23	23	24	23	28	27	25
19	Remittent fever.....	23	12	14	17	20	21	22	20	27	32	31	28
20	Diphtheria.....	10	12	10	11	8	5	6	10	10	10	13	13
21	Smallpox.....	3	12	13	11	2	.7	.1	.09	1	.5	1	.3
22	Cholera infantum.....	17	12	11	15	22	14	16	14	15	22	20	18
23	Whooping-cough.....	11	11	11	7	8	6	8	7	12	14	18	15
24	Puerperal fever.....	6	4	4	7	4	5	5	7	6	7	6	9
25	Typho-mal. fever.....	5	4	3	3	5	3	5	2	6	8	8	9
26	Inflam. of brain.....	6	3	3	3	3	5	5	6	7	8	9	8
27	Meningitis.....	4	3	3	3	3	7	6	3	4	2	4	5
28	Membran. croup.....	3	1	1	1	1	2	2	3	2	4	5	5
	No. of observers.....	§196	212	203	229	210	213	217	167	144	185	189	205
	Av.No.of observers per month	110	122	124	126	118	111	114	98	82	94	116	113

\* Table 3 is manuscript; not printed for lack of space. † For 1903 the names of the observers and the number of the reports received from each are stated in Table 2.

‡ Foot note on page 75. § Average per year.

TABLE 4.\*—CONTINUED.—Per cent of observers by whom the several diseases were months for the period

Per cent of observers by whom the diseases were reported present.†												
Line number.	January.				February.				March.			
	Diseases.	Av. 1893-1902.	1903.	1902.	Diseases.	Av. 1893-1902.	1903.	1902.	Diseases.	Av. 1893-1902.	1903.	1902.
	Average.....	29	26	29	Average.....	27	26	28	Average.....	29	25	27
1	Tonsillitis.....	76	79	72	Influenza.....	83	74	72	Influenza.....	83	78	69
2	Bronchitis.....	75	72	75	Tonsillitis.....	72	74	73	Rheumatism.....	81	74	76
3	Rheumatism.....	80	71	80	Bronchitis.....	76	71	76	Tonsillitis.....	73	73	69
4	Neuralgia.....	76	67	76	Rheumatism.....	79	70	80	Neuralgia.....	78	69	71
5	Influenza.....	81	67	77	Neuralgia.....	77	67	74	Bronchitis.....	76	66	74
6	Pneumonia.....	55	46	57	Pneumonia.....	56	41	52	Pneumonia.....	57	47	52
7	Diarrhea.....	42	38	47	Pleuritis.....	37	37	40	Diarrhea.....	41	34	39
8	Pleuritis.....	40	37	42	Diarrhea.....	38	34	42	Pleuritis.....	40	29	41
9	Inflam. of kidney.....	35	34	41	Inflam. of kidney.....	33	29	44	Inflam. of kidney.....	34	28	38
10	Scarlet fever.....	24	25	38	Scarlet fever.....	19	27	27	Scarlet fever.....	18	23	23
11	Erysipelas.....	27	22	24	Consumption, pul.....	30	23	24	Measles.....	20	22	20
12	Smallpox.....	3	22	19	Erysipelas.....	27	21	19	Consumption, pul.....	31	22	25
13	Consumption, pul.....	31	21	25	Smallpox.....	3	20	19	Smallpox.....	5	16	23
14	Intermittent fever.....	22	19	16	Intermittent fever.....	19	19	18	Intermittent fever.....	24	16	20
15	Measles.....	13	18	18	Measles.....	14	19	18	Erysipelas.....	27	16	15
16	Inflam. of bowels.....	20	16	21	Whooping-cough.....	10	16	10	Whooping-cough.....	10	15	7
17	Typhoid fev. (ent.).....	13	15	16	Inflam. of bowels.....	19	15	23	Typhoid fev. (ent.).....	9	14	13
18	Whooping-cough.....	12	13	11	Remittent fever.....	17	14	11	Inflam. of bowels.....	22	14	20
19	Diphtheria.....	12	11	9	Diphtheria.....	11	13	8	Diphtheria.....	9	9	8
20	Remittent fever.....	19	9	11	Typhoid fev. (ent.).....	10	12	10	Remittent fever.....	17	9	14
21	Dysentery.....	12	7	10	Dysentery.....	9	6	11	Dysentery.....	11	9	8
22	Puerperal fever.....	7	6	8	Cholera morbus.....	6	5	9	Cholera morbus.....	8	6	5
23	Inflam. of brain.....	6	5	5	Puerperal fever.....	6	5	6	Puerperal fever.....	7	4	5
24	Cholera morbus.....	8	5	7	Inflam. of brain.....	6	3	3	Inflam. of brain.....	5	4	2
25	Meningitis.....	4	3	3	Meningitis.....	4	2	4	Typho-mal. fever.....	3	3	8
26	Membran. croup.....	4	3	2	Cholera infantum.....	3	2	2	Cholera infantum.....	2	3	8
27	Typho-mal. fever.....	4	2	2	Typho-mal. fever.....	2	2	2	Meningitis.....	5	9	2
28	Cholera infantum.....	3	2	8	Membran. croup.....	4	5	2	Membran. croup.....	3	0	3
	Observers§.....	106	126	122	Observers§.....	109	125	124	Observers§.....	105	116	118
Line number.	April.				May.				June.			
	Diseases.	Av. 1893-1902.	1903.	1902.	Diseases.	Av. 1893-1902.	1903.	1902.	Diseases.	Av. 1893-1902.	1903.	1902.
	Average.....	27	27	27	Average.....	27	24	23	Average.....	26	21	22
1	Rheumatism.....	78	72	77	Rheumatism.....	80	68	68	Rheumatism.....	76	69	69
2	Influenza.....	74	72	65	Tonsillitis.....	66	66	61	Tonsillitis.....	57	58	56
3	Tonsillitis.....	69	71	73	Neuralgia.....	73	63	64	Neuralgia.....	70	57	67
4	Neuralgia.....	76	71	69	Bronchitis.....	68	55	57	Bronchitis.....	60	49	47
5	Bronchitis.....	73	70	67	Influenza.....	57	45	46	Diarrhea.....	57	39	53
6	Pneumonia.....	47	51	43	Diarrhea.....	46	38	35	Influenza.....	38	35	28
7	Diarrhea.....	43	44	43	Measles.....	27	35	23	Consumption, pul.....	33	30	25
8	Pleuritis.....	36	33	40	Pneumonia.....	38	35	35	Measles.....	24	26	23
9	Inflam. of kidney.....	32	32	37	Inflam. of kidney.....	34	32	28	Inflam. of kidney.....	31	23	25
10	Measles.....	25	27	32	Consumption, pul.....	35	28	24	Scarlet fever.....	16	21	20
11	Inflam. of bowels.....	20	24	16	Intermittent fever.....	33	23	22	Pneumonia.....	23	20	22
12	Scarlet fever.....	18	22	28	Scarlet fever.....	18	20	23	Intermittent fever.....	32	17	25
13	Intermittent fever.....	28	20	22	Pleuritis.....	33	19	31	Pleuritis.....	26	16	26
14	Smallpox.....	4	20	21	Erysipelas.....	28	19	18	Inflam. of bowels.....	25	14	17
15	Erysipelas.....	26	19	20	Inflam. of bowels.....	23	18	19	Erysipelas.....	25	13	16
16	Consumption, pul.....	33	18	25	Smallpox.....	3	15	14	Cholera morbus.....	23	12	16
17	Typhoid fev. (ent.).....	7	18	8	Whooping-cough.....	11	15	12	Whooping-cough.....	12	12	15
18	Whooping-cough.....	10	16	9	Remittent fever.....	22	14	17	Diphtheria.....	8	11	7
19	Diphtheria.....	6	15	6	Diphtheria.....	8	11	9	Remittent fever.....	24	11	13
20	Remittent fever.....	19	13	18	Typhoid fev. (ent.).....	8	11	14	Smallpox.....	4	11	13
21	Inflam. of brain.....	6	4	2	Cholera morbus.....	13	9	7	Typhoid fev. (ent.).....	9	9	17
22	Cholera morbus.....	8	4	4	Dysentery.....	12	5	8	Cholera infantum.....	16	6	6
23	Meningitis.....	5	3	6	Cholera infantum.....	7	4	3	Dysentery.....	17	4	10
24	Dysentery.....	10	3	7	Typho-mal. fever.....	3	4	1	Puerperal fever.....	6	4	2
25	Typho-mal. fever.....	2	2	0	Inflam. of brain.....	7	3	4	Inflam. of brain.....	6	3	3
26	Puerperal fever.....	7	2	5	Meningitis.....	6	3	7	Meningitis.....	4	3	2
27	Cholera infantum.....	4	2	3	Puerperal fever.....	7	3	4	Typho mal. fever.....	3	2	5
28	Membran. croup.....	3	1	0	Membran. croup.....	3	2	7	Membran. croup.....	1	8	2
	Observers§.....	99	93	100	Observers§.....	112	120	138	Observers§.....	118	133	126

\* † ‡ These notes are on the preceding page. § The numbers in this line

Reported present by months in each of the years 1902-1903,† and the average by  
of 10 years, 1893-1902.

Per cent of observers by whom the diseases were reported present.†

July.				August.				September.				Line number.
Diseases.	Av. 1893-1902.	1903.	1902.	Diseases.	Av. 1893-1902.	1903.	1902.	Diseases.	Av. 1893-1902.	1903.	1902.	
Average.....	27	24	24	Average.....	29	25	24	Average.....	30	27	25	
Rheumatism.....	74	68	69	Diarrhea.....	84	72	68	Diarrhea.....	83	75	73	1
Tonsillitis.....	57	58	59	Rheumatism.....	74	67	67	Rheumatism.....	74	69	72	2
Neuralgia.....	67	56	56	Neuralgia.....	68	61	63	Neuralgia.....	68	62	65	3
Diarrhea.....	73	56	67	Tonsillitis.....	57	58	55	Tonsillitis.....	56	61	63	4
Bronchitis.....	52	48	38	Bronchitis.....	54	53	47	Bronchitis.....	60	61	56	5
Inflam. of kidney.....	30	30	24	Dysentery.....	54	40	31	Cholera infantum.....	47	40	30	6
Cholera morbus.....	44	29	31	Cholera morbus.....	66	36	42	Dysentery.....	55	39	35	7
Influenza.....	28	28	25	Cholera infantum.....	50	32	34	Cholera morbus.....	51	37	32	8
Pleuritis.....	23	27	22	Influenza.....	29	28	24	Influenza.....	37	33	38	9
Consumption, pul.....	34	27	26	Inflam. of kidney.....	27	28	24	Typhoid fev. (ent.).....	30	32	27	10
Intermittent fever.....	34	27	27	Typhoid fev. (ent.).....	24	28	23	Pleuritis.....	22	31	18	11
Inflam. of bowels.....	28	21	23	Intermittent fever.....	37	26	25	Consumption, pul.....	31	28	25	12
Typhoid fev. (ent.).....	15	21	16	Inflam. of bowels.....	33	23	21	Inflam. of kidney.....	27	27	25	13
Cholera infantum.....	34	18	25	Consumption, pul.....	32	22	24	Intermittent fever.....	38	25	25	14
Dysentery.....	34	18	22	Pleuritis.....	19	21	17	Inflam. of bowels.....	28	22	22	15
Scarlet fever.....	14	18	17	Scarlet fever.....	14	18	21	Scarlet fever.....	13	19	16	16
Measles.....	17	18	21	Erysipelas.....	19	17	13	Pneumonia.....	16	18	20	17
Erysipelas.....	23	16	19	Remittent fever.....	29	12	16	Remittent fever.....	30	17	15	18
Pneumonia.....	25	16	19	Pneumonia.....	12	12	11	Diphtheria.....	8	11	7	19
Remittent fever.....	26	14	14	Whooping-cough.....	12	10	12	Erysipelas.....	18	9	12	20
Whooping-cough.....	12	12	15	Diphtheria.....	7	9	5	Whooping-cough.....	11	9	9	21
Smallpox.....	3	9	11	Measles.....	7	9	7	Smallpox.....	1	7	5	22
Diphtheria.....	7	8	8	Smallpox.....	2	9	8	Typho-mal. fever.....	11	5	6	23
Puerperal fever.....	5	7	3	Puerperal fever.....	6	6	3	Inflam. of brain.....	5	5	3	24
Inflam. of brain.....	6	5	3	Inflam. of brain.....	6	3	3	Puerperal fever.....	5	3	6	25
Meningitis.....	3	3	7	Meningitis.....	4	2	2	Meningitis.....	4	3	2	26
Typho-mal. fever.....	6	2	4	Typho-mal. fever.....	9	2	4	Measles.....	5	2	9	27
Membran. croup.....	1	8	0	Membran. croup.....	1	7	1	Membran. croup.....	1	8	2	28
Observers§.....	118	119	139	Observers§.....	115	137	131	Observers§.....	115	129	130	
October.				November.				December.				Line number.
Diseases.	Av. 1893-1902.	1903.	1902.	Diseases.	Av. 1893-1902.	1903.	1902.	Diseases.	Av. 1893-1902.	1903.	1902.	
Average.....	29	25	26	Average.....	28	22	23	Average.....	27	25	28	
Rheumatism.....	75	74	70	Rheumatism.....	75	68	67	Tonsillitis.....	73	76	78	1
Neuralgia.....	72	65	67	Tonsillitis.....	68	65	65	Neuralgia.....	73	69	71	2
Tonsillitis.....	66	64	70	Neuralgia.....	72	61	64	Rheumatism.....	77	69	77	3
Diarrhea.....	70	64	60	Bronchitis.....	69	60	62	Influenza.....	71	64	66	4
Bronchitis.....	65	57	63	Influenza.....	58	50	51	Bronchitis.....	72	64	71	5
Influenza.....	45	41	43	Diarrhea.....	49	40	43	Pneumonia.....	43	44	50	6
Typhoid fev. (ent.).....	33	32	28	Inflam. of kidney.....	30	27	25	Pleuritis.....	34	34	43	7
Intermittent fever.....	37	29	30	Pleuritis.....	29	26	30	Diarrhea.....	43	34	50	8
Inflam. of kidney.....	29	28	26	Pneumonia.....	36	25	37	Inflam. of kidney.....	30	33	29	9
Dysentery.....	39	27	26	Typhoid fev. (ent.).....	26	25	23	Scarlet fever.....	22	29	30	10
Consumption, pul.....	29	26	24	Consumption, pul.....	29	25	25	Consumption, pul.....	29	26	24	11
Cholera morbus.....	29	26	25	Scarlet fever.....	18	18	20	Typhoid fev. (ent.).....	18	22	19	12
Inflam. of bowels.....	24	20	18	Intermittent fever.....	29	18	22	Erysipelas.....	27	21	24	13
Pneumonia.....	24	19	26	Diphtheria.....	13	15	16	Intermittent fever.....	23	18	18	14
Pleuritis.....	26	18	27	Erysipelas.....	22	14	14	Diphtheria.....	13	17	18	15
Scarlet fever.....	17	16	21	Inflam. of bowels.....	18	13	17	Inflam. of bowels.....	20	14	22	16
Remittent fever.....	30	16	16	Cholera morbus.....	11	11	7	Measles.....	8	8	13	17
Cholera infantum.....	24	15	15	Dysentery.....	15	10	5	Remittent fever.....	21	7	12	18
Diphtheria.....	12	13	15	Remittent fever.....	25	8	11	Smallpox.....	4	6	16	19
Erysipelas.....	20	12	17	Typho-mal. fever.....	7	7	6	Typho-mal. fever.....	5	6	3	20
Typho-mal. fever.....	9	6	5	Whooping-cough.....	10	6	8	Dysentery.....	9	6	10	21
Whooping-cough.....	8	5	12	Measles.....	6	5	11	Cholera infantum.....	2	6	8	22
Meningitis.....	3	4	2	Membran. croup.....	4	3	2	Meningitis.....	3	4	3	23
Measles.....	4	2	5	Smallpox.....	2	3	6	Puerperal fever.....	5	3	3	24
Smallpox.....	1	2	3	Cholera infantum.....	5	3	2	Whooping-cough.....	10	8	16	25
Membran. croup.....	3	2	2	Inflam. of brain.....	5	2	4	Inflam. of brain.....	5	2	3	26
Puerperal fever.....	5	2	4	Puerperal fever.....	5	8	2	Cholera morbus.....	7	2	8	27
Inflam. of brain.....	6	2	4	Meningitis.....	2	0	2	Membran. croup.....	4	9	3	28
Observers§.....	111	129	122	Observers§.....	109	120	122	Observers§.....	107	117	119	

state how many observers reported for the month in the given year.



TABLE 5.—WEEKLY REPORTS OF DISEASES IN MICHIGAN IN 1903.—Exhibiting for the year and for each month of the year ending January 2, 1904, a summary relative to diseases in the State of Michigan; also for each month a summary relative to diseases in each of 11 geographical divisions\* of the State.—Indicating the prevalence as regards time and area. Compiled from 5,647 weekly reports by 212 health officers of cities and villages and voluntary correspondents of the State Board of Health, reporting the diseases under their observation.

Number of observers, reports, etc.†	Diseases.	Average order of prevalence where present.														
		Average per cent of observers report- ing presence of. b	Average per cent of weeks reported where present. c	Per cent of reports stating presence of. d	Average order of prevalence where present. e	1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.	Av. 1893- 1902.
	Average for tabulated diseases reported present.	25	65	16	2.9	2.8	2.9	2.8	2.8	2.6	2.7	2.7	3.0	3.0	3.3	2.9
	Brain, inflammation of.....	3	39	1	5.0	4.6	4.0	3.3	3.7	3.6	3.4	4.1	4.0	4.8	4.3	4.0
	Bowels, inflammation of.....	18	50	9	3.8	3.8	3.7	3.7	3.6	3.3	3.3	3.5	3.6	3.8	4.0	3.6
	Bronchitis.....	60	78	48	2.5	2.5	2.6	2.6	2.5	2.5	2.6	2.4	2.6	2.6	2.5	2.5
	Meningitis.....	3	33	9	4.1	4.2	3.3	3.6	3.3	3.2	3.4	3.6	3.7	3.9	4.4	3.7
	Cholera infantum.....	12	45	5	3.1	3.1	3.0	3.0	3.1	2.8	2.9	2.9	3.0	3.3	3.4	3.1
	Cholera morbus.....	16	48	8	3.2	3.0	2.9	2.9	2.9	2.7	3.0	2.9	3.0	3.3	3.3	3.0
	Consumption, pulmonary.....	25	79	20	3.3	3.1	3.1	3.0	2.9	2.9	3.1	3.0	3.5	3.4	3.5	3.2
	Croup, membranous.....	1	30	4	3.7	3.9	4.3	4.0	3.7	3.6	2.9	3.9	4.6	4.5	4.1	4.0
	Diphtheria.....	12	49	6	3.3	3.3	3.5	3.5	3.4	3.1	2.9	3.7	4.4	3.5	3.4	3.5
	Diarrhea.....	48	64	31	2.6	2.7	2.6	2.4	2.5	2.4	2.5	2.5	2.5	2.5	2.6	2.5
	Dysentery.....	15	47	7	3.4	3.3	3.2	3.2	3.0	3.0	3.2	3.0	3.2	3.3	3.6	3.2
	Erysipelas.....	17	48	8	3.8	3.6	3.8	3.7	3.7	3.3	3.4	3.5	3.7	3.8	3.9	3.6
	Fever, intermittent.....	21	57	12	3.0	2.9	3.0	2.9	2.9	2.6	2.7	2.7	2.9	2.9	2.9	2.8
	Fever, remittent.....	12	51	6	3.3	3.3	3.3	3.2	3.3	2.9	3.2	2.9	3.1	3.1	2.9	3.1
	Fever, typhoid (enteric).....	20	62	13	3.1	3.2	3.1	2.8	2.9	2.9	3.3	3.3	3.4	3.6	3.2	3.2
	Fever, typho-malarial.....	4	45	2	2.7	3.7	3.7	3.0	2.6	3.1	2.7	2.8	3.2	3.7	3.6	3.2

localities represented per month, 118.  
localities represented per month, 122.  
observers during the year, 5,647.  
reports compiled, 471.  
reports per month, 471.

localities represented per  
month, 118.  
observers during the year,  
123.  
reports compiled, 5,647.  
reports per month, 471.

ending January 2, 1904.

For the year	Whole number of Average number of Whole number of Average number of	50	72	37	2.1	2.1	1.9	2.1	1.7	1.7	1.8	1.8	2.0	2.2	2.0	1.9
Influenza.....		20	64	19	3.7	3.6	3.7	3.5	3.4	3.2	3.4	3.5	3.6	3.7	3.7	3.5
Kidney, inflammation of.....		16	57	9	2.9	2.5	2.5	2.4	2.3	2.7	2.3	2.7	3.1	2.8	2.8	2.6
Measles.....		64	76	49	2.5	2.4	2.5	2.5	2.4	2.3	2.4	2.3	2.5	2.5	2.5	2.4
Neuralgia.....		27	55	15	3.8	3.7	3.7	3.7	3.6	3.3	3.6	3.4	3.8	3.8	3.8	3.6
Pleuritis.....		30	56	17	3.6	3.3	3.5	3.6	3.5	3.2	3.4	3.2	3.7	3.7	3.6	3.5
Pneumonia.....		4	35	1	3.8	2.8	3.1	3.4	3.5	3.1	3.1	3.2	3.5	3.9	3.8	3.3
Puerperal fever.....		70	81	57	2.1	2.1	2.3	2.3	2.3	2.2	2.3	2.3	2.7	2.6	2.6	2.4
Rheumatism.....		21	62	13	3.1	3.0	2.7	3.0	3.1	2.7	3.0	3.1	3.5	3.3	3.6	3.1
Scarlet fever.....		12	60	7	3.0	2.9	2.8	2.7	4.7	2.0	2.0	6.3	2.8	4.1	4.8	3.5
Smallpox.....		67	69	46	2.7	2.7	2.9	2.9	2.7	2.7	2.6	2.6	3.0	3.0	2.8	2.8
Tonsillitis.....		11	62	7	2.6	2.5	2.8	2.5	2.3	2.4	2.1	2.4	2.6	2.9	3.0	2.6
Whooping-cough.....																

\* The counties in each division are shown on maps of the State, on pages 201 and 217 of the report of this board for 1886.

† The names of observers, and number of reports received from each, are shown in Table 2.

a Not every one of the observers sent in a report for every week, so that the number of reports received does not equal the number of observers multiplied by the number of weeks.

b The numbers in this column (pages 72-75) state not what per cent of the whole number of observers for the year reported the disease present at some time during the year, but the average (for the twelve months) of the per cents of observers making reports for the several months) by which the disease was reported present in those months. The column for the year is thus a statement for an average month. But on pages 74 and 75 the numbers in the "per cent of observers" column are statements for the month, and not averages. This column indicates the area of prevalence except that in a few instances there are two or more observers in one city or village.

c This column states what per cent the number of reports received for the year or given month, what per cent the number of reports which stated a disease to be present is of the number of card-reports received, for the given time, from such of the observers as reported the disease present. It is therefore an average, not for all localities represented, but only for those at which the given disease was reported present. For tabulated diseases it states what per cent the number of times all diseases were reported present is of the number of times they might have been so reported on the cards received, for the time specified, from the observers who, during that time reported the diseases present (that is, if each of the observers had on every card he sent reported every disease present which he reported present at all). It will be seen that this is a more accurate average than would be obtained by dividing the sum of the column by the number of diseases reported present.

d This column states what per cent the number of reports stating presence of a disease is of the whole number of reports received for the time specified, from all observers in the State, or Division, as the case may be. It combines, and states, in a general way, an idea of the time a disease was prevalent, with an idea of the area of its prevalence. Had every observer sent a report every week of the month or year, the numbers in this column would be (for the State) the product of the number of the number of reports received for the time specified, from all observers in the State, and so on. Diseases not present were to be marked 0.

e The disease having the greatest number of cases was to be marked 1 in the order; the disease having the next greatest number of cases 2, and so on. Diseases not present were to be marked 0. The numbers in this column are found by dividing the totals (for the State) the order of prevalence column, in Table 3 (a table giving statements for each locality; omitted in printing this report, for want of room), by the number of observers who reported the disease present. The column is, therefore, an average, not for all localities represented, but only for those at which the given disease was reported present. The numbers in the "average" lines for this column are found by dividing the sum of the totals in the order of prevalence columns, in Table 3, for all diseases reported present, by the sum of the numbers of observers who reported the different diseases present, thus counting each observer once for every disease he reported present. As a rule, small numbers in this column indicate a large prevalence of the disease, and vice versa; but the greater the number of diseases reported present by each observer from week to week, the greater will be the "average" in this column.





Av. for tab. dis. rep. pres.	24	59	14	2.8	25	64	16	2.9	27	62	17	2.7	25	65	16	2.6	22	69	15	2.7	25	66	16	2.9
Brain, inflammation of	5	43	2	4.2	3	57	2	5.0	5	38	2	4.0	2	25	4	5.5	2	50	9	6.5	2	50	1	7.5
Bowels, inflammation of	21	44	10	3.8	23	53	12	3.3	22	58	12	3.5	20	44	9	3.7	13	82	7	3.3	14	44	6	4.0
Bronchitis	48	72	26	2.8	53	72	30	2.9	61	68	41	3.2	57	76	42	2.4	60	82	49	2.3	64	82	53	2.3
Measles	3	25	8	2.3	2	30	6	8.7	3	35	1	3.5	4	32	1	3.0	0	33	2	2.8	4	33	2	2.8
Cholera infantum	18	42	8	3.0	32	58	19	3.3	40	45	18	2.8	15	37	6	3.2	3	25	7	4.3	6	30	2	3.6
Cholera morbus	29	45	13	2.9	36	56	21	3.1	37	56	21	3.0	26	42	11	3.0	11	35	4	4.1	2	38	6	7.0
Consumption, pulmonary	27	75	21	3.3	22	81	18	3.0	28	78	22	3.0	26	81	25	6.3	25	87	22	2.9	26	78	21	3.1
Croup, membranous	8	20	2	5.0	7	75	6	3.0	8	20	2	3.0	2	25	6	3.7	3	36	1	5.3	9	33	2	1.0
Diphtheria	8	52	4	2.3	9	49	5	2.8	11	44	5	2.4	13	57	8	2.7	15	58	8	3.3	17	48	8	3.9
Diarrhea	56	71	41	2.1	72	77	55	1.8	75	76	57	1.6	64	69	43	2.2	40	60	25	2.8	34	56	20	3.5
Dysentery	18	41	8	3.8	40	53	21	3.3	39	54	21	3.1	27	50	14	3.4	10	41	4	4.3	6	35	2	3.6
Erysipelas	16	38	6	3.8	17	44	8	3.5	9	47	5	3.3	12	45	5	4.0	14	56	8	3.2	21	43	9	3.8
Fever, intermittent	27	57	16	2.4	26	55	15	2.7	25	60	14	2.9	29	56	16	2.5	18	57	10	3.2	18	53	10	3.1
Fever, remittent	14	43	6	2.8	12	56	7	3.3	17	46	8	2.7	16	47	8	2.6	7	53	5	2.8	7	53	4	3.3
Fever, typhoid (enteric)	21	45	9	3.0	28	61	17	2.9	32	63	21	2.9	32	68	21	2.9	25	72	18	2.7	22	67	15	3.5
Fever, typho-malarial	2	43	6	3.5	2	42	1	1.0	5	41	2	2.6	6	61	4	1.5	7	54	3	2.8	6	31	2	3.4
Influenza	28	55	16	2.5	28	63	18	2.6	33	54	18	2.7	41	59	25	2.3	50	67	34	2.2	64	71	46	1.9
Kidney, inflammation of	30	60	19	3.3	28	64	17	3.2	27	62	17	3.3	28	67	18	3.3	37	77	21	3.8	33	72	24	3.6
Measles	18	57	10	2.9	9	51	4	3.8	2	25	3	5.0	2	45	1	1.7	5	43	2	3.3	8	56	4	4.0
Neuralgia	56	73	43	2.2	61	74	46	2.4	62	71	43	2.5	65	79	52	2.3	61	73	45	2.4	69	78	53	2.5
Pleuritis	27	43	12	3.5	21	57	13	3.9	31	40	15	3.7	18	60	11	3.2	26	58	15	3.4	34	59	21	4.1
Pneumonia	16	47	7	3.7	12	37	5	4.9	18	37	7	3.0	19	50	10	3.9	25	59	14	3.4	44	48	21	3.4
Puerperal fever	7	34	2	3.5	6	41	2	4.5	3	41	1	3.0	2	43	6	4.0	8	75	7	2.0	3	22	8	3.5
Rheumatism	68	76	52	1.9	67	75	51	2.2	69	80	55	2.2	74	80	59	2.0	68	81	56	2.0	69	83	57	2.2
Scarlet fever	18	49	8	3.4	18	57	11	3.2	19	54	10	2.6	16	77	13	2.6	18	65	12	3.1	29	54	16	3.1
Smallpox	9	55	5	2.4	9	57	6	2.2	7	62	5	2.2	2	36	9	3.0	3	71	2	2.3	6	58	4	4.0
Tonsillitis	58	61	38	2.7	58	64	38	3.0	61	61	37	2.8	64	68	43	2.4	65	73	48	2.2	76	69	53	2.5
Whooping-cough	12	54	7	2.9	10	77	8	2.4	9	62	5	2.2	5	50	3	1.2	6	68	4	1.4	3	100	31	1.8

[Foot-note from page 69.]

The numbers opposite the names of the diseases do not state what per cent of the whole number of observers for the year reported the disease present at some time during the year, but state (on an average for the twelve months of the year) by what per cent of the observers making reports for the several months, the disease was reported present in those months. The columns for each year is thus a statement for an average month of that year. On the two following pages of this table, however, the columns for each month state what per cent of the observers for that month (the number of whom is stated at the foot of the column) reported the given disease in that month.



TABLE 5.—CONTINUED.—Diseases in the Upper Peninsula, the Northwestern, the Northern, and the Northeastern Divisions of the State for the year and by months in 1903; also an average for the period of 10 years, 1893-1902,—indicating what per cent of the weekly reports received stated the presence of the diseases named.<sup>a</sup>

Division.*	Diseases.	Av. 1893-1902.	1903†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	Av. for tab. dis. rep. pres. ....	19	15	14	17	18	16	10	9	12	16	17	19	15	17
Upper Peninsula Division.*															
	Brain, inflammation of.....	3	4	0	0	5	0	0	0	0	0	0	0	0	0
	Bowels, inflammation of.....	11	2	0	0	0	0	0	0	0	0	0	0	0	0
	Bronchitis.....	54	26	50	44	52	60	16	16	12	15	23	18	25	4
	Measles.....	5	1	0	0	5	0	0	4	5	0	0	0	0	0
	Cholera infantum.....	15	6	5	0	5	5	0	0	9	23	11	0	0	11
	Cholera morbus.....	11	6	0	0	5	0	0	0	8	0	27	11	5	4
	Consumption, pulmonary.....	40	36	18	39	19	25	37	48	45	35	37	36	50	36
	Croup, membranous.....	2	7	0	0	0	0	0	0	0	0	0	0	5	4
	Diphtheria.....	10	30	27	39	24	25	32	36	36	15	26	18	18	57
	Diarrhea.....	43	28	18	28	33	25	5	8	18	46	52	45	18	32
	Dysentery.....	14	7	5	11	5	0	5	8	9	23	11	5	0	0
	Erysipelas.....	10	6	0	0	0	0	0	4	5	12	4	9	0	7
	Fever, intermittent.....	1	2	0	0	0	0	0	0	18	4	0	0	0	0
	Fever, remittent.....	8	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fever, typhoid (enteric).....	24	31	32	44	43	40	11	12	14	27	48	50	41	11
	Fever, typho-malarial.....	6	1	0	0	5	0	0	0	0	12	0	0	0	0
	Influenza.....	39	25	36	61	57	40	5	4	0	19	19	9	23	36
	Kidney, inflammation of.....	19	8	9	0	0	0	0	0	0	8	19	14	18	18
	Measles.....	8	6	27	22	5	5	21	0	0	0	0	0	0	0
	Neuralgia.....	45	24	5	17	14	45	26	8	23	23	26	50	18	36
	Pleuritis.....	13	9	5	6	10	5	0	0	0	8	0	20	18	25
	Pneumonia.....	26	25	9	33	62	45	32	12	27	12	19	27	14	25
	Puerperal fever.....	4	3	0	0	0	5	0	0	0	8	0	9	14	4
	Rheumatism.....	49	41	55	44	62	30	37	40	36	38	48	45	27	32
	Scarlet fever.....	21	27	32	22	29	15	5	12	23	27	41	50	32	29
	Smallpox.....	4	2	5	17	5	0	0	0	0	0	0	0	0	0
	Tonsillitis.....	52	44	50	44	52	40	37	28	32	38	48	55	50	50
	Whooping-cough.....	15	20	0	0	0	0	11	16	23	27	37	36	36	36
Northwestern Division.*															
	Av. 1893-1902.	19	24	27	26	28	22	25	23	24	24	23	23	20	20
	1903†	1	2	0	0	5	5	5	6	12	17	15	15	10	10
	Brain, inflammation of.....	12	10	15	17	19	15	15	5	0	0	0	0	0	0
	Bowels, inflammation of.....	56	74	90	83	81	70	79	78	80	73	60	65	79	65
	Bronchitis.....	2	1	0	0	0	0	0	0	0	0	0	0	0	0
	Measles.....	11	9	0	4	0	0	0	17	8	18	30	22	0	0
	Cholera infantum.....	14	16	0	4	5	0	0	5	11	28	41	50	26	5
	Cholera morbus.....	29	37	30	30	38	35	37	50	32	45	40	30	38	38
	Consumption, pulmonary.....	1	7	0	0	0	0	0	0	0	0	0	0	0	0
	Croup, membranous.....	42	45	35	35	29	10	68	44	48	68	67	57	38	31
	Diphtheria.....	12	16	0	0	10	5	0	0	20	41	47	39	19	0
	Diarrhea.....	14	11	30	30	24	15	5	6	16	9	0	0	0	0
	Dysentery.....	21	5	20	17	0	10	0	0	0	0	3	9	0	0
	Erysipelas.....	15	4	0	0	0	0	0	0	12	0	17	0	10	0
	Fever, intermittent.....	12	21	20	4	0	10	0	0	20	27	37	35	38	38
	Fever, remittent.....	4	4	0	0	0	0	0	0	0	0	0	0	0	0
	Fever, typhoid (enteric).....	42	46	70	35	81	70	68	44	28	23	7	26	29	46
	Fever, typho-malarial.....	18	32	45	62	62	35	49	17	8	23	23	30	29	31
	Influenza.....	9	5	6	0	0	5	0	17	28	5	0	0	5	0
	Kidney, inflammation of.....	55	69	80	74	76	70	79	67	72	68	63	65	62	62
	Measles.....	24	32	50	48	57	45	32	39	24	23	0	17	29	42
	Neuralgia.....	3	2	0	9	0	0	0	6	0	9	0	0	0	0
	Pleuritis.....	56	68	70	65	86	75	89	72	72	64	63	61	52	54
	Pneumonia.....	12	24	15	9	24	25	32	33	28	27	13	26	29	27
	Puerperal fever.....	1	9	0	17	19	65	79	78	20	5	0	9	10	12
	Rheumatism.....	44	70	100	91	95	65	79	78	72	45	53	61	43	45
	Scarlet fever.....	4	10	20	17	29	10	0	6	0	9	0	0	0	0
	Smallpox.....	1	9	0	17	19	65	79	78	20	5	0	9	10	12
	Tonsillitis.....	4	10	20	17	29	10	0	6	0	9	0	0	0	0
	Whooping-cough.....	4	10	20	17	29	10	0	6	0	9	0	0	0	0

Av. for tab. dis. rep. pres.....	19	12	17	18	17	14	11	7	9	12	11	10	9	10	Northern Division.*										23	37	37	39	42	37	32	37	40	41	44	37	32	31						
Brain, inflammation of.....	3	8	0	0	4	6	0	0	0	0	0	0	0	0	Northern Division.*										2	10	25	0	0	0	40	0	0	0	0	0	0	0	0	0				
Bowels, inflammation of.....	12	1	0	0	0	0	0	0	0	18	0	0	0	0	Northern Division.*										29	79	100	100	75	60	100	0	0	0	0	0	0	0	0	0	0			
Bronchitis.....	64	48	87	73	70	72	32	20	27	41	37	21	56	52	Northern Division.*										69	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100			
Measles.....	2	2	0	0	0	11	5	0	5	0	0	4	0	0	Northern Division.*										7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Cholera infantum.....	9	5	4	0	13	0	0	0	5	18	15	4	0	0	Northern Division.*										5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Cholera morbus.....	11	2	4	0	0	0	5	0	5	6	0	0	0	0	Northern Division.*										6	10	0	0	0	0	0	20	50	40	0	0	0	0	0	0	0	0		
Consumption, pulmonary.....	16	15	22	9	13	0	37	32	32	24	4	4	0	0	Northern Division.*										11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Croup, membranous.....	9	0	0	0	0	0	0	0	0	0	0	0	0	0	Northern Division.*										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Diphtheria.....	6	4	0	14	22	0	0	0	0	0	0	8	6	0	Northern Division.*										8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Diarrhea.....	35	23	35	32	17	11	5	8	32	65	39	33	13	0	Northern Division.*										46	50	75	25	25	40	75	100	75	100	75	100	75	100	75	100	75	100	75	100
Dysentery.....	16	3	0	0	0	0	0	0	0	6	15	4	0	5	Northern Division.*										7	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Erysipelas.....	18	6	4	9	17	6	11	4	0	12	0	0	0	10	Northern Division.*										32	96	100	75	100	80	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Fever, intermittent.....	12	14	9	9	13	0	16	16	27	18	30	25	0	0	Northern Division.*										5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Fever, remittent.....	11	9	4	5	17	6	32	8	0	0	26	4	0	10	Northern Division.*										11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Fever, typhoid (enteric).....	8	5	0	5	9	0	0	0	5	12	7	21	0	0	Northern Division.*										2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Fever, typho-malarial.....	2	8	0	0	0	0	0	0	0	0	7	0	0	0	Northern Division.*										2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Influenza.....	43	27	52	86	65	83	11	0	0	0	0	0	6	29	Northern Division.*										59	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Kidney, inflammation of.....	21	12	9	9	22	33	21	0	9	18	0	4	0	24	Northern Division.*										52	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Measles.....	9	4	0	5	9	0	11	12	9	0	0	4	0	0	Northern Division.*										6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Neuralgia.....	60	51	65	64	70	67	32	36	27	47	52	58	50	48	Northern Division.*										65	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Pluritis.....	25	7	9	23	13	17	0	0	5	0	0	4	13	5	Northern Division.*										43	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Pneumonia.....	21	11	30	18	13	22	5	4	0	0	7	0	13	14	Northern Division.*										23	44	25	75	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Puerperal fever.....	4	4	0	0	0	0	5	0	0	0	0	0	0	0	Northern Division.*										2	4	0	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheumatism.....	67	49	78	82	52	50	47	32	45	18	41	58	50	33	Northern Division.*										72	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Scarlet fever.....	8	2	17	0	0	0	0	0	0	0	0	0	0	5	Northern Division.*										7	4	0	0	0	0	0	0	20	25	0	0	0	0	0	0	0	0		
Smallpox.....	2	3	0	5	0	0	5	12	5	0	7	0	0	0	Northern Division.*										6	29	0	50	100	0	0	50	20	50	80	0	0	0	0	0	0	0	0	0
Tonsillitis.....	47	32	57	50	22	22	11	16	23	35	37	29	50	34	Northern Division.*										57	98	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Whooping-cough.....	7	2	0	0	4	0	5	8	0	0	0	0	0	0	Northern Division.*										4	17	0	50	50	20	0	0	80	0	0	0	0	0	0	0	0	0	0	0

\* f. d. These notes are on the first page of Table 5.

TABLE 5.—CONTINUED.—Diseases in the Western, Northern Central, Bay and Eastern, and the Central Divisions of the State for the year and by months in 1903; also an average for the period of 10 years, 1893-1902—indicating what per cent of the weekly reports received stated the presence of the diseases named.

Division.*	Diseases	Av. 1893-1902.	1903.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	Av. for tab. dis. rep. pres. ....	18	17	16	15	16	17	16	18	17	18	17	15	17	13
Western Division.*	Brain, inflammation of.....	2	5	4	2	0	0	0	0	0	0	0	3	0	0
	Bowels, inflammation of.....	11	12	10	8	11	10	17	16	19	15	14	13	0	0
	Bronchitis.....	45	49	50	42	51	57	44	48	35	44	54	47	53	50
	Meningitis.....	2	2	0	0	0	0	0	0	0	0	0	0	0	0
	Cholera infantum.....	8	5	0	0	0	0	2	7	6	19	21	4	0	0
	Cholera morbus.....	8	4	0	0	0	0	0	6	21	18	4	0	0	0
	Consumption, pulmonary.....	21	12	0	6	13	2	2	9	19	10	21	21	19	13
	Croup, membranous.....	1	1	0	0	0	0	0	0	2	6	0	3	5	0
	Diphtheria.....	4	5	0	10	4	0	2	9	7	4	5	2	2	6
	Diarrhea.....	35	34	19	15	6	19	24	43	48	67	60	55	31	19
	Dysentery.....	12	7	0	0	0	0	2	0	9	21	23	19	5	2
	Erysipelas.....	16	11	17	13	11	10	7	11	13	17	9	0	10	9
	Fever, intermittent.....	21	20	10	12	11	24	22	18	24	19	26	28	24	19
	Fever, remittent.....	24	15	13	15	11	12	15	23	20	15	16	19	14	9
Northern Central Division.*	Fever, typhoid (enteric).....	7	9	8	2	2	0	10	5	7	13	18	13	10	19
	Fever, typho-malarial.....	3	3	2	0	4	0	0	0	0	0	5	0	12	9
	Influenza.....	48	46	60	58	66	60	44	39	20	19	28	38	57	70
	Kidney, inflammation of.....	20	11	13	2	4	12	12	11	13	15	11	17	12	15
	Measles.....	8	9	23	25	19	19	17	9	2	2	0	0	0	0
	Neuralgia.....	58	53	54	56	49	64	54	50	54	50	46	55	48	60
	Pleuritis.....	15	15	12	9	10	10	16	9	13	11	19	5	9	9
	Pneumonia.....	19	19	15	15	23	26	29	36	17	0	9	15	12	34
	Puerperal fever.....	2	4	0	6	0	0	2	0	17	4	9	0	0	2
	Rheumatism.....	62	61	55	59	49	62	61	64	61	52	61	62	76	72
	Scarlet fever.....	8	13	15	15	29	7	7	13	9	10	11	11	10	26
	Smallpox.....	2	10	15	8	13	7	7	14	7	10	11	0	10	15
	Tonsillitis.....	43	53	52	54	55	60	59	55	44	46	49	53	50	68
	Whooping-cough.....	0	3	4	2	6	12	2	9	4	2	0	0	0	0

	16	13	17	15	15	13	13	10	12	12	14	12	11	13	18	16	19	19	18	18	13	13	15	15	16	15	16
Av. for tab. dis. rep. pres. ....																											
Brain, inflammation of.....	1	7	3	2	0	0	2	2	0	2	0	0	0	0	3	2	0	1	3	2	3	2	2	3	2	4	4
Bowels, inflammation of.....	10	13	11	6	12	14	18	14	13	13	13	13	13	13	11	11	6	6	10	5	10	10	10	10	12	12	12
Bronchitis.....	44	33	49	50	49	37	26	22	13	26	26	37	37	32	53	44	63	58	60	52	42	34	36	35	37	34	41
Meningitis.....	1	1	0	3	0	1	0	0	0	1	0	0	0	7	1	1	4	1	0	0	1	1	9	0	4	2	0
Cholera infantum.....	10	6	0	0	0	0	2	16	21	14	9	2	2	3	8	5	0	0	0	0	0	4	15	15	7	1	3
Cholera morbus.....	11	9	0	0	1	8	22	25	24	22	24	2	2	3	11	8	3	8	7	3	5	15	13	19	13	4	0
Consumption, pulmonary.....	21	11	12	6	8	10	14	13	11	18	16	10	7	7	33	21	22	32	24	24	27	20	16	12	20	22	23
Croup, membranous.....	7	4	2	0	0	0	0	0	0	0	0	1	2	0	6	3	0	0	0	2	0	1	0	0	8	0	0
Diphtheria.....	32	27	18	17	27	21	29	21	29	43	48	28	20	21	39	29	19	10	13	14	16	19	39	53	50	42	20
Diarrhea.....	12	6	0	2	0	0	2	11	10	18	16	2	7	7	13	10	4	4	4	5	3	5	9	21	23	15	10
Dysentery.....	10	12	25	16	10	13	19	6	8	10	6	6	17	11	10	5	3	9	4	12	8	3	2	3	0	5	4
Erysipelas.....	12	9	3	3	3	6	8	5	12	16	17	9	8	11	18	8	13	14	11	2	6	4	7	10	7	12	5
Fever, intermittent.....	8	4	3	9	5	3	2	5	3	11	2	6	2	0	15	6	9	18	7	7	6	7	4	5	5	6	3
Fever, remittent.....	12	11	6	9	8	9	10	5	4	11	30	22	10	0	15	17	17	5	15	14	10	8	11	25	23	25	22
Fever, typhoid (enteric).....	3	3	5	2	7	1	0	0	0	0	3	12	5	1	3	2	0	0	0	0	0	4	3	9	2	8	3
Fever, typho-malarial.....	39	29	48	52	58	41	20	11	16	11	11	13	25	43	43	37	64	69	75	52	29	22	18	20	17	31	32
Influenza.....	14	20	28	27	19	20	24	16	22	15	18	10	17	19	18	22	10	15	9	12	22	21	23	22	20	30	27
Kidney, inflammation of.....	7	2	0	2	0	1	8	3	7	0	0	0	3	0	8	12	24	26	19	22	34	16	8	2	0	4	2
Measles.....	46	35	48	42	44	40	32	32	26	25	31	28	33	38	59	47	50	47	60	50	42	45	49	46	39	49	41
Neuralgia.....	17	16	23	30	15	19	10	5	14	5	16	7	17	22	15	9	17	10	11	10	4	8	5	6	10	0	8
Pleuritis.....	17	17	38	52	22	21	19	8	4	2	8	10	18	22	17	13	23	18	21	40	18	9	4	5	4	8	14
Pneumonia.....	2	7	6	0	0	0	0	1	0	1	0	0	0	1	1	5	1	0	0	2	0	0	9	2	8	0	0
Puerperal fever.....	52	41	43	52	51	41	49	42	41	30	40	39	40	46	64	57	62	64	60	64	56	57	50	48	51	60	62
Rheumatism.....	10	13	22	23	22	19	17	29	11	3	7	6	5	3	9	14	14	27	25	26	18	10	6	5	7	13	13
Scarlet fever.....	2	9	26	11	12	11	12	8	8	10	7	1	3	0	3	8	22	19	7	24	11	9	4	5	4	0	0
Smallpox.....	40	28	45	28	34	37	22	18	20	23	24	29	28	33	43	43	67	62	55	41	37	37	39	29	32	43	48
Tonsillitis.....	7	2	8	3	2	1	7	0	0	0	1	1	0	0	6	6	6	6	3	0	11	3	5	13	7	2	4
Whooping-cough.....																											

Bay and Eastern Division.\*

(Central Division.\*)

\* t. d. These notes are on the first page of Table 5.



TABLE 5.—CONTINUED.—Diseases in the Southwestern and Southern Central Divisions of the State, for the year and by months in 1903, also an average for the period of 10 years, 1893-1902—indicating what per cent of weekly reports received stated the presence of the diseases named.<sup>d</sup>

Division.*	Av. 1893-1902	1903.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Av. for tab. dis. rep. pres.....	20	21	18	20	19	21	24	19	22	24	22	21	23	22
Brain, inflammation of.....	3	2	4	0	2	0	2	7	5	0	5	0	0	0
Bowels, inflammation of.....	12	9	4	2	0	4	12	11	14	23	23	9	3	2
Bronchitis.....	51	59	52	57	58	65	61	55	61	49	56	72	73	90
Meningitis.....	1	3	0	0	0	0	0	0	0	2	0	0	0	2
Cholera infantum.....	14	12	0	2	0	2	14	4	16	44	39	9	0	0
Cholera morbus.....	16	10	0	0	0	2	5	7	25	35	27	9	5	0
Consumption, pulmonary.....	22	21	23	23	29	23	23	17	23	4	16	24	22	20
Croup, membranous.....	2	5	4	2	0	0	0	0	0	0	0	0	0	0
Diphtheria.....	3	4	4	4	0	15	5	0	0	9	3	4	5	2
Diarrhea.....	38	47	25	25	20	31	51	45	61	73	75	59	54	29
Dysentery.....	12	9	4	2	0	0	5	0	0	36	30	13	0	0
Erysipelas.....	15	8	6	13	9	6	2	2	0	7	8	15	14	18
Fever, intermittent.....	36	37	31	25	40	31	33	41	48	44	38	46	38	33
Fever, remittent.....	22	11	11	8	4	8	14	9	11	13	13	11	11	9
Fever, typhoid (enteric).....	7	15	7	13	11	21	9	9	11	13	14	17	35	22
Fever, typho-malarial.....	3	1	2	0	0	0	0	4	0	2	2	0	2	2
Influenza.....	54	46	61	66	71	67	53	30	27	22	17	30	54	58
Kidney, inflammation of.....	20	19	19	11	11	25	26	22	18	15	20	22	19	18
Measles.....	8	14	6	13	16	13	30	28	27	13	3	0	14	16
Neuralgia.....	62	52	49	64	63	67	57	66	67	58	72	68	71	71
Pleuritis.....	15	21	17	25	20	23	14	17	16	27	20	30	33	33
Pneumonia.....	20	21	26	30	31	21	35	11	18	5	3	11	30	36
Puerperal fever.....	2	2	0	4	2	0	2	4	0	5	2	2	0	2
Rheumatism.....	73	71	57	64	69	65	72	70	77	82	69	76	81	80
Scarlet fever.....	10	13	13	17	0	17	33	17	9	13	14	0	3	13
Smallpox.....	6	6	19	11	0	15	9	5	7	0	63	72	84	82
Tonsillitis.....	45	66	54	60	56	63	98	57	55	9	8	0	0	0
Whooping-cough.....	7	9	11	21	20	13	5	4	9	9	8	0	0	0

\*. f. d. These notes are on the first page of Table 5.

TABLE 5.—CONCLUDED.—Diseases in the Southeastern Division of the State, for the year and by months in 1903; also an average for the period of 10 years, 1893-1902—indicating what per cent of the weekly reports received stated the presence of the diseases named.\*

Division.*	Diseases.	Av. 1893-1902.	1903†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	Av. for tab. dis. rep. pres. ....	15	14	16	18	19	15	14	11	13	12	13	14	13	14
Southeastern Division.*	Brain, inflammation of .....	1	1	0	3	0	0	0	0	0	5	5	0	0	2
	Bowels, inflammation of .....	8	12	5	29	25	21	12	3	10	17	13	9	11	0
	Bronchitis .....	46	46	50	65	63	52	49	36	43	36	38	46	39	45
	Meningitis .....	1	4	3	0	0	2	0	0	0	0	0	0	0	0
	Cholera infantum .....	6	3	0	0	0	0	0	0	10	10	13	3	3	0
	Cholera morbus .....	3	4	3	0	3	0	5	7	5	5	8	11	8	0
	Consumption, pulmonary .....	25	15	13	15	16	2	10	14	14	17	25	26	18	13
	Croup, membranous .....	1	2	0	0	0	0	2	0	0	0	0	0	0	0
	Diphtheria .....	5	8	5	5	6	2	10	7	2	2	5	11	26	11
	Diarrhea .....	31	30	21	20	22	26	29	20	50	38	45	49	24	17
	Dysentery .....	8	3	3	9	3	0	0	0	12	17	3	0	0	0
	Erysipelas .....	6	3	5	5	6	0	12	0	0	0	0	3	0	2
	Fever, intermittent .....	13	7	5	3	9	14	15	3	12	2	5	6	0	4
	Fever, remittent .....	9	6	0	3	0	10	10	3	10	0	8	9	8	9
	Fever, typhoid (enteric) .....	12	7	5	0	0	7	0	2	7	7	8	14	11	23
	Fever, typho-malarial .....	2	8	0	3	0	0	2	3	0	0	0	0	0	0
	Influenza .....	35	27	39	68	72	38	22	9	10	10	15	14	16	23
	Kidney, inflammation of .....	18	20	24	25	28	19	0	3	26	21	13	17	29	36
	Malaria .....	8	8	8	15	22	14	7	14	7	7	0	0	0	0
	Neuralgia .....	42	39	42	48	44	43	46	39	24	31	43	43	26	45
	Pleuritis .....	13	23	26	20	22	21	29	11	26	24	38	26	21	21
	Pneumonia .....	15	12	24	33	34	33	20	7	7	5	8	11	16	30
	Pyæral fever .....	2	6	8	0	0	0	0	0	0	0	0	0	0	0
	Rheumatism .....	55	49	61	55	47	36	49	66	45	40	48	57	39	49
	Scarlet fever .....	11	15	21	20	22	7	7	11	0	21	13	26	26	19
	Smallpox .....	8	8	26	23	28	17	2	0	5	5	0	0	0	0
	Tonsillitis .....	36	35	55	50	50	33	41	36	36	36	18	17	32	38
	Whooping-cough .....	5	9	8	23	22	19	12	7	10	0	0	0	5	0

\* , t, d. These notes are on the first page of Table 5.

TABLE 6.—A Summary for the year 1903, relative to diseases in each of the 11 divisions of the State,—indicating the prevalence as regards both time and area.

Diseases	Upper Peninsular Division.*				Northwestern Division.*				Northern Division.*				Northeastern Division.*				Western Division.*			
	Per cent of observers reporting presence of. b	Average present where reported present. c	Per cent of reports stating presence of. d	Average present where reported present. e	Per cent of observers reporting presence of. b	Average present where reported present. c	Per cent of reports stating presence of. d	Average present where reported present. e	Per cent of observers reporting presence of. b	Average present where reported present. c	Per cent of reports stating presence of. d	Average present where reported present. e	Per cent of observers reporting presence of. b	Average present where reported present. c	Per cent of reports stating presence of. d	Average present where reported present. e	Per cent of observers reporting presence of. b	Average present where reported present. c	Per cent of reports stating presence of. d	Average present where reported present. e
Av. for tab. dis. reported present.....	23	63	15	2.6	32	73	24	4.1	21	59	14	2.0	44	85	37	3.9	27	64	17	2.6
Brain, inflammation of.....	1	25	4	4.0	4	42	2	5.0	3	33	8	4.5	25	36	10	5.0	2	25	5	3.3
Bowels, inflammation of.....	8	24	2	2.7	17	55	10	6.8	3	50	1	2.5	100	79	79	5.0	21	90	12	2.6
Bronchitis.....	41	63	26	4.5	81	90	74	3.0	58	80	48	1.7	100	100	100	4.0	62	78	49	2.9
Measles.....	6	24	1	2.7	3	50	1	11.0	6	38	2	2.0	0	0	0	0	7	25	5	2.0
Menigitis.....	15	40	6	2.7	17	45	9	4.0	17	29	2	1.9	0	0	0	0	13	39	5	2.8
Cholera infantum.....	15	42	6	3.5	29	49	16	4.1	16	27	2	2.0	25	36	10	5.0	11	42	4	2.8
Cholera morbus.....	39	88	36	1.6	41	87	37	5.7	23	70	15	1.8	0	0	0	0	22	51	12	2.3
Consumption, pulmonary.....	3	29	7	1.5	3	25	7	11.5	0	0	0	2.8	0	0	0	0	3	41	1	3.8
Croup, membranous.....	41	70	30	2.1	17	43	8	6.8	7	61	4	2.8	0	0	0	0	11	39	5	2.3
Diphtheria.....	37	76	28	2.7	62	72	45	3.8	45	51	23	1.9	75	67	50	4.8	55	63	34	2.5
Diarrhea.....	14	59	7	2.8	29	54	16	4.9	14	45	3	1.6	17	44	8	5.0	13	51	7	2.6
Dysentery.....	18	31	6	3.5	22	49	11	5.3	14	35	6	2.5	100	96	96	4.8	22	47	11	2.8
Erysipelas.....	4	23	2	2.3	9	54	5	3.8	25	51	14	1.9	0	0	0	0	31	62	20	2.2
Fever, remittent.....	0	0	0	0	9	38	4	3.0	17	57	9	1.8	0	0	0	0	19	48	9	3.0
Fever, remittent.....	46	63	31	2.9	26	70	21	5.2	13	39	5	2.6	0	0	0	0	5	52	3	2.6
Fever, typhoid (enteric).....	3	67	1	1.5	1	33	4	1.0	1	40	8	1.0	100	100	100	3.2	60	77	46	2.0
Fever, typho-malarial.....	39	63	25	1.8	59	80	46	3.4	35	73	12	1.7	100	100	100	1.0	21	55	9	3.3
Influenza.....	8	84	8	3.0	53	78	32	6.6	23	46	4	1.8	0	0	0	0	18	57	9	2.0
Kidney, inflammation of.....	10	59	6	2.7	9	50	5	6.0	68	75	51	1.8	100	100	100	2.4	71	75	63	2.6
Measles.....	45	54	24	2.8	77	90	69	2.9	68	75	51	2.8	100	100	100	5.0	24	46	11	3.8
Neuralgia.....	18	46	9	3.1	58	59	35	4.9	17	45	7	2.9	100	100	100	4.9	38	48	19	2.8
Pleuritis.....	42	57	25	3.1	40	66	32	4.7	22	48	11	1.4	75	75	75	4.0	44	44	4	3.0
Pneumonia.....	42	57	25	3.1	40	66	32	4.7	22	48	11	1.4	100	100	100	5.0	24	46	11	3.8
Puerperal fever.....	7	41	3	3.2	4	42	2	9.3	71	69	49	1.8	17	25	4	5.0	7	44	4	3.0
Rheumatism.....	55	75	41	2.3	74	92	68	2.4	1	45	2	2.3	100	100	100	3.0	77	79	61	2.1
Scarlet fever.....	44	56	27	3.0	32	70	24	4.6	4	45	2	2.0	50	58	29	4.2	16	61	10	2.2
Smallpox.....	4	45	2	2.7	13	63	29	4.4	7	50	3	2.0	100	98	98	4.7	23	57	13	2.8
Tonsillitis.....	59	75	44	2.2	84	83	70	3.2	64	51	32	1.8	100	100	100	3.6	75	69	53	2.3
Whooping-cough.....	18	96	20	1.5	14	70	10	2.6	4	33	2	2.0	42	50	17	3.6	7	44	3	2.3

TABLE 6.—CONCLUDED.

Disease.	Northern Central Division.*				Bay and Eastern Division.*				Central Division.*				Southwestern Division.*				Southern Central Division.*				Southeastern Division.*			
	Per cent of observers re-ported present where	Av. per cent of weeks re-ported present where	Per cent of reports stat-ing presence of d	Av. order of prevalence where present e	Per cent of observers re-ported present where	Av. per cent of weeks re-ported present where	Per cent of reports stat-ing presence of d	Av. order of prevalence where present e	Per cent of observers re-ported present where	Av. per cent of weeks re-ported present where	Per cent of reports stat-ing presence of d	Av. order of prevalence where present e	Per cent of observers re-ported present where	Av. per cent of weeks re-ported present where	Per cent of reports stat-ing presence of d	Av. order of prevalence where present e	Per cent of observers re-ported present where	Av. per cent of weeks re-ported present where	Per cent of reports stat-ing presence of d	Av. order of prevalence where present e	Per cent of observers re-ported present where	Av. per cent of weeks re-ported present where	Per cent of reports stat-ing presence of d	Av. order of prevalence where present e
Av. for tab. dia. rep. present.....	24	62	15	2.9	22	60	13	2.9	24	65	16	2.9	30	70	21	3.3	22	68	16	2.8	23	60	14	2.1
Brain, inflammation of.....	1	25	4	4.0	3	33	7	6.0	4	46	2	6.6	5	41	2	3.7	2	50	1	4.2	4	27	1	3.6
Bowels, inflammation of.....	11	38	5	4.8	25	74	13	3.9	18	49	9	4.4	17	57	9	4.2	10	36	4	4.0	60	74	46	2.8
Bronchitis.....	60	76	51	2.5	45	3	33	2.4	57	76	44	2.5	72	81	59	2.7	63	80	52	2.4	2	29	4	1.8
Measles.....	1	25	4	7.0	3	40	1	4.5	3	39	1	3.7	1	25	3	5.0	3	25	3	3.4	5	63	3	2.8
Meningitis.....	15	36	6	2.6	13	47	6	3.1	10	45	5	3.9	19	63	12	3.4	5	33	2	3.1	2	29	4	2.6
Cholera infantum.....	12	47	6	2.0	17	55	9	2.7	17	49	8	3.7	20	50	10	2.9	15	47	8	3.3	12	34	4	2.7
Cholera morbus.....	24	88	25	4.1	17	64	11	2.3	23	82	21	3.9	24	87	21	5.7	26	88	24	2.3	22	69	15	2.1
Consumption, pulmonary.....	0	0	0	1.0	1	30	4	2.3	1	23	3	3.3	2	27	5	2.0	8	29	2	3.5	8	25	2	2.0
Croup, membranous.....	7	35	3	5.0	11	35	5	2.9	12	50	6	4.2	11	40	4	3.5	5	51	3	4.1	17	43	8	2.3
Diphtheria.....	40	64	33	2.6	44	45	6	3.7	45	64	29	4.2	64	70	47	2.8	34	63	4	2.7	51	58	30	2.0
Dysentery.....	20	38	8	3.7	14	61	27	2.7	19	50	10	3.3	20	48	8	3.8	11	36	4	3.0	6	44	3	2.6
Erysipelas.....	14	40	6	2.2	19	48	9	3.3	16	53	8	3.5	52	70	37	3.0	16	51	8	3.7	16	40	7	2.2
Fever, intermittent.....	21	44	3	3.0	20	50	11	4.6	23	73	17	2.6	19	75	15	3.5	8	49	3	3.9	10	48	6	2.8
Fever, remittent.....	18	63	12	3.2	20	50	11	2.1	23	73	17	2.6	19	75	15	3.5	8	49	3	3.9	10	48	6	2.8
Fever, typhoid (enteric).....	1	25	14	3.2	6	45	29	2.1	5	71	2	3.3	3	77	45	4.0	2	38	8	3.2	2	50	8	1.8
Fever, typho-malarial.....	1	25	14	3.2	6	45	29	2.1	5	71	2	3.3	3	77	45	4.0	2	38	8	3.2	2	50	8	1.8
Influenza.....	38	63	23	2.6	42	68	29	1.8	51	71	37	1.9	57	77	46	2.0	54	76	42	2.0	47	56	27	2.0
Kidney, inflammation of.....	20	53	13	2.6	32	62	20	3.8	34	63	22	3.4	32	60	19	4.1	24	68	16	4.1	33	61	20	2.4
Measles.....	53	88	49	2.5	35	35	2	3.2	26	54	14	2.8	26	54	14	4.5	19	59	11	2.5	55	69	39	2.2
Neuralgia.....	72	98	49	2.5	45	35	35	3.8	65	80	62	2.7	80	62	2.7	4.5	65	81	54	2.5	55	69	39	2.2
Pleuritis.....	24	38	10	4.1	31	63	17	3.5	18	45	9	3.8	31	69	21	4.1	25	53	14	3.9	33	67	23	2.5
Pneumonia.....	23	51	18	4.4	31	63	17	3.5	24	45	9	3.8	31	69	21	4.1	25	53	14	3.9	33	67	23	2.5
Puerperal fever.....	9	24	8	4.7	5	25	7	3.5	2	32	5	2.2	7	32	2	3.8	2	36	8	4.8	2	25	6	2.3
Rheumatism.....	84	94	71	1.7	69	82	41	2.1	83	86	71	2.2	83	86	71	2.2	69	85	59	2.3	68	73	49	1.9
Scarlet fever.....	22	74	13	3.1	22	61	13	2.9	19	63	14	3.2	19	63	13	4.2	16	58	9	2.9	22	69	15	2.1
Smallpox.....	15	44	6	4.0	15	64	8	2.9	8	78	6	3.3	8	78	6	3.3	16	56	3	3.3	16	56	3	1.8
Tonsillitis.....	66	65	43	3.3	52	55	23	2.9	83	78	65	2.8	83	78	65	2.8	68	70	50	2.7	60	57	35	2.1
Whooping-cough.....	12	57	6	3.2	5	41	2	2.4	10	55	6	1.8	13	63	9	5.1	12	66	8	2.8	12	71	9	1.8

\* Counties in each division are shown on maps of the State, on pages 201 and 217 of the report of this Board for 1888. b, c, d, e Foot-notes with these marks are below the first part of Table 5.



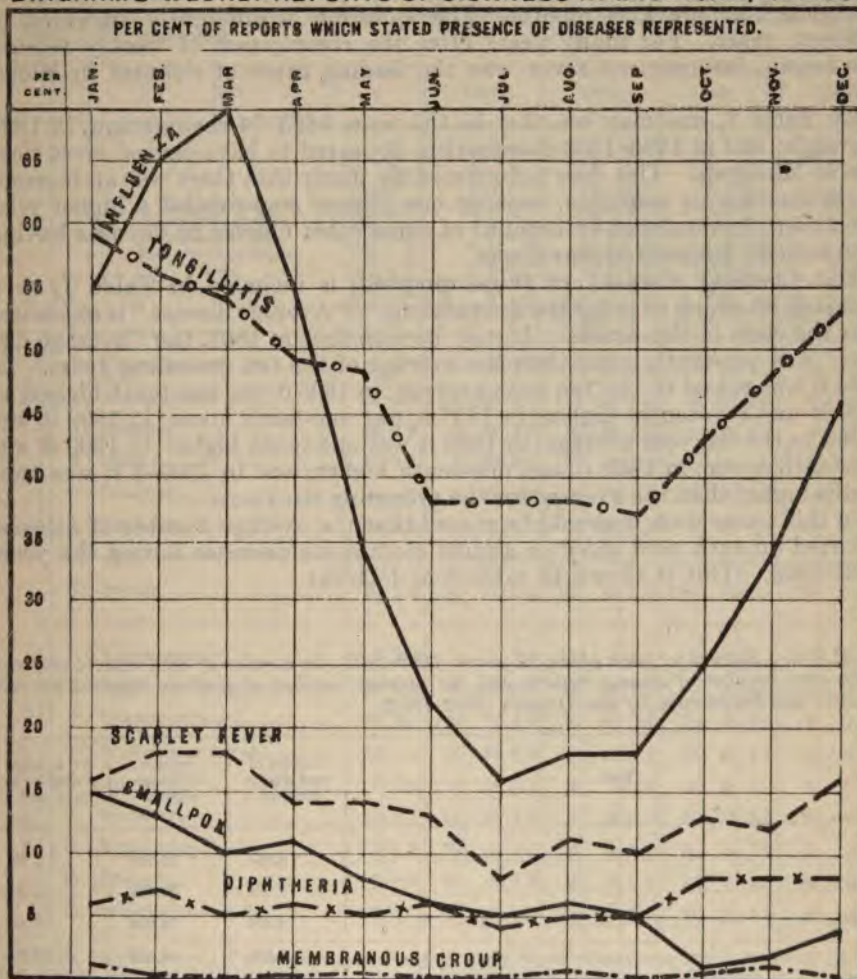
## 84 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1904.

DISEASES IN MICHIGAN, ARRANGED IN ORDER OF PREVALENCE, THOSE WHICH CAUSED MOST SICKNESS FIRST.

TABLE 7.—Order of prevalence of 28 diseases in Michigan, in the period of 11 years, 1893-1903, and in each of those years; also the average order for the 10 years, 1893-1902; judging from the "per cent of reports," which stated the presence of each of the diseases, in connection with the reported "order of prevalence" when and where each disease was present. The diseases are arranged in the order of greatest prevalence in the 10 years, 1893-1902. (The method of rating diseases for this table is described and illustrated in a "compiling table" on pages 122 and 123 of the annual report for 1890.)

Order, 1893-1902.	Diseases arranged in order of greatest prevalence.	1903.	1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.	Average 10 years, 1893-1902.
1	Rheumatism.....	1	1	1	1	1	1	1	1	3	1	1	1
2	Neuralgia.....	2	2	3	2	3	3	3	2	1	2	2	2
3	Influenza.....	4	4	2	3	2	2	2	3	2	4	3	3
4	Bronchitis.....	3	3	4	4	4	4	4	4	4	3	4	4
5	Tonsillitis.....	5	5	5	6	5	6	5	5	6	6	5	5
6	Diarrhea.....	6	6	6	5	6	5	6	6	5	5	6	6
7	Consumption, pulmonary..	8	9	8	9	7	10	11	7	10	7	8	9
(8)	(The average disease).....	7	7	8	10	8	9	10	7	8	9	10	9
8	Intermittent fever.....	9	10	10	11	9	8	10	8	7	8	7	9
9	Whooping-cough.....	7	8	14	7	10	9	8	11	8	10	11	10
10	Measles.....	11	7	9	8	8	11	7	14	18	11	10	10
11	Cholera morbus.....	17	15	11	12	12	23	14	12	11	12	13	14
12	Remittent fever.....	20	20	19	17	19	12	20	9	9	9	9	14
13	Cholera infantum.....	18	18	16	13	17	14	13	17	12	15	15	15
14	Dysentery.....	22	21	17	16	11	15	16	13	13	13	17	15
15	Pneumonia.....	16	11	15	20	16	18	18	10	16	16	12	15
16	Scarlet fever.....	12	12	7	14	18	13	19	18	19	14	19	15
17	Typhoid fever (enteric)....	10	14	13	10	13	16	25	19	17	18	14	16
18	Inflammation of kidney....	15	17	18	18	14	17	21	16	14	17	16	17
19	Smallpox.....	14	13	12	15	28	7	9	28	15	26	28	18
20	Pleuritis.....	21	19	21	21	20	19	26	15	21	22	20	20
21	Typho-malarial fever.....	13	25	26	19	15	24	12	21	20	23	22	21
22	Diphtheria.....	19	22	23	25	24	22	15	24	27	19	18	22
23	Erysipelas.....	24	23	25	26	23	20	22	20	23	21	21	22
24	Inflammation of bowels....	23	24	24	24	21	21	23	22	22	20	23	22
25	Puerperal fever.....	26	16	20	23	25	25	24	23	24	24	24	23
26	Meningitis.....	27	27	22	27	22	26	28	25	25	25	27	25
27	Membranous croup.....	25	26	28	28	27	28	17	26	28	27	25	26
28	Inflammation of brain.....	28	28	27	22	26	27	27	27	26	28	26	26

DIAGRAM 2—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1903.



[ PLATE 1222 ]

*Diseases which cause most sickness in Michigan.*—This is shown in Table 7, and more specifically in Table 9, in this report, and in similar tables or "exhibits" in previous reports. The question is differently answered in different years. For many years after the compilation of weekly reports was begun, intermittent fever was the leading cause of sickness in Michigan.

By Table 7, one may see that in the years 1893-94 rheumatism, in 1895 neuralgia, and in 1896-1903 rheumatism appeared to have caused most sickness in Michigan. This does not necessarily imply that there was an increase in rheumatism or neuralgia, because one disease *may* exhibit a higher relative order of prevalence on account of some other disease or diseases having been actually lessened in prevalence.

The "average disease" of those reported, is included in Table 7, as a standard by which to judge the fluctuations. "Average disease" is explained near the close of this article. It may be seen that in 1893, the "average disease" was one-tenth lower than the average of the ten preceding years. In 1894 it was raised to the ten year average; in 1895 it was one-tenth higher; in 1896 it was two-tenths higher; in 1897 it was one-tenth lower; in 1898 it was raised to the ten year average; in 1899 it was one-tenth higher; in 1900 it was one-tenth lower; in 1901 it was one-tenth higher; and in 1902-3 it was two-tenths higher than the average for the preceding ten years.

In this connection it should be stated that the average number of diseases reported on each card show an almost continuous decrease during the years 1893-1903. This is shown in table 8 as follows:

TABLE 8.—*Stating for each of the 11 years, 1893-1903, the number of card reports received, the total number of disease reports and the average number of diseases reported on each card; also the average for the 10 years, 1893-1902.*

Year.	Number of card reports received.	Number of disease reports.	Av. number of diseases on each card.
1893.....	5,853	32,723	5.59
1894.....	5,572	30,619	5.50
1895.....	4,394	24,004	5.46
1896.....	3,940	19,443	4.93
1897.....	4,418	21,828	4.94
1898.....	5,219	24,946	4.78
1899.....	5,126	24,700	4.82
1900.....	5,513	28,463	5.34
1901.....	5,850	28,941	4.95
1902.....	5,979	28,087	4.70
Average 10 years, 1893-1902.....	5,186	26,375	5.10
1903.....	5,647	25,716	4.55

TABLE 9.—*Diseases from which there seems to have been the most sickness in Michigan in 1903, as indicated by the per cent of weekly reports stating presence of the diseases, as studied in connection with the average order of prevalence of said diseases when reported present; also order, per cent of reports and average order for the same diseases in 1902, 1901, 1900, and 1899.*

	Order.*	1903.			1902.			1901.			1900.			1899.		
		Diseases in order of apparent amount of sickness in 1903. Most prevalent disease first.			Per cent of reports stating presence of. d Av. order of prevalence when present. e			Per cent of reports stating presence of. d Av. order of prevalence when present. e			Per cent of reports stating presence of. d Av. order of prevalence when present. e			Per cent of reports stating presence of. d Av. order of prevalence when present. e		
More sickness than av. for 28 diseases.	1	Rheumatism.....	57	2.1	1	59	2.1	1	61	2.3	1	63	2.3	1	63	2.3
	2	Neuralgia.....	49	2.5	2	52	2.4	3	57	2.5	2	56	2.5	3	56	2.4
	3	Bronchitis.....	48	2.5	3	47	2.5	4	50	2.6	4	49	2.6	4	50	2.5
	4	Influenza.....	37	2.1	4	37	2.1	2	44	1.9	3	40	2.1	2	42	1.7
	5	Tonsillitis.....	46	2.7	5	47	2.7	5	46	2.9	6	45	2.9	5	42	2.7
	6	Diarrhea.....	31	2.6	6	33	2.7	6	36	2.6	5	40	2.4	6	37	2.5
	(7)	Average.....	16	2.9	(7)	17	2.8	(8)	18	2.9	(10)	18	2.8	(8)	17	2.8
Less than said average.	7	Whooping-cough.....	7	2.6	8	7	2.5	14	5	2.8	7	5	2.5	10	4	2.3
	8	Consumption, pulmonary.....	20	3.3	9	20	3.1	8	22	3.1	9	25	3.0	7	22	2.9
	9	Intermittent fever.....	12	3.0	10	13	2.9	10	14	3.0	11	16	2.9	9	17	2.9
	10	Typhoid fever, (enteric).....	13	3.1	14	12	3.2	13	13	3.1	10	15	2.8	13	9	2.9
	11	Measles.....	9	2.9	7	10	2.5	9	5	2.5	8	13	2.4	8	6	2.3
	12	Scarlet fever.....	13	3.1	12	14	3.0	7	14	2.7	14	12	3.0	18	8	3.1
	13	Typho-malarial fever.....	2	2.7	25	2	3.7	26	1	3.7	19	3	3.0	15	1	2.6
	14	Smallpox.....	7	3.0	13	8	2.9	12	7	2.8	15	1	2.7	28	4	4.7
	15	Inflammation of kidney.....	19	3.7	17	18	3.6	18	20	3.7	18	20	3.5	14	19	3.4

\* Judging from the per cent of reports which stated presence of the disease in connection with the order of prevalence when present. The method of rating diseases, as causes of sickness, is fully described and illustrated by a "compiling table" on pages 122 and 123 of the annual report for the year 1890.

d This column states what per cent the number of reports stating presence of a disease is of the whole number of reports received, for the time specified, from *all observers* in the State. It combines and states in a general way, an idea of the time a disease was prevalent, with an idea of the area of its prevalence.

e The disease having the greatest number of cases was to be marked 1, in the order; the disease having the next greatest number of cases, 2; and so on. Diseases not present were to be marked 0. The numbers in this column are found by dividing the totals of the order of prevalence columns in Table 3 (omitted from this report because of lack of room), by the number of observers who reported the disease present. The column is, therefore, an average, not for all the localities represented, but only for those at which the given disease was reported present. The numbers in the "average" lines for this column are found by dividing the sum of the totals in the order of prevalence columns, in Table 3, for all diseases reported present, by the sum of the numbers of observers, who reported the different diseases present, thus counting each observer once for every disease he reported present. As a rule, small numbers in this column indicate the large prevalence of the disease, and *vice versa*; but the greater the number of diseases reported present, by each observer, from week to week, the greater will be the average in this column.



TABLE 10.—In each of 11 geographical divisions of the State the 15 diseases from which there seems to have been the greatest amount of sickness in 1903, as indicated by the per cent of weekly reports stating presence of each of 28 leading diseases, when studied in connection with the average order of prevalence of said diseases when reported present.

	Order.*	Diseases in order of apparent amount of sickness. Most prevalent disease first.	Per cent of reports stating presence of. d		Diseases in order of apparent amount of sickness. Most prevalent disease first.	Per cent of reports stat- ing presence of. d		Diseases in order of apparent amount of sickness. Most prevalent disease first.	Per cent of reports stat- ing presence of. d	
			Av. order of prevalence when present. e			Av. order of prevalence when present. e			Av. order of prevalence when present. e	
More sickness than av. for 28 diseases.		UPPER PENINSULAR DIVISION.†			NORTHWESTERN DIVISION.†			NORTHERN DIVI- SION.†		
	1	Consumption, pul.....	36	1.6	Bronchitis.....	74	3.0	Neuralgia.....	51	1.8
	2	Tonsillitis.....	44	2.2	Rheumatism.....	68	2.4	Bronchitis.....	48	1.7
	3	Rheumatism.....	41	2.3	Neuralgia.....	69	2.9	Rheumatism.....	49	1.8
	4	Diphtheria.....	30	2.1	Tonsillitis.....	70	3.2	Tonsillitis.....	32	1.8
	5	Influenza.....	25	1.8	Influenza.....	46	3.4	Influenza.....	27	1.7
	6	Whooping-cough.....	20	1.5	Diarrhea.....	45	3.8	Diarrhea.....	23	1.9
	7	Typhoid fever (ent.)....	31	2.9	Pleuritis.....	35	4.9	Consumption, pul.....	15	1.8
	8	Diarrhea.....	28	2.7	Pneumonia.....	32	4.7	Intermittent fever.....	14	1.9
	9	Bronchitis.....	26	2.7	Consumption, pul.....	37	5.7	Typho-mal. fever.....	.8	1.0
	(10)				Average.....	24	4.1	Average.....	12	2.0
	10	Scarlet fever.....	27	3.0	Typho-mal. fever.....	.4	1.0	Remittent fever.....	9	1.8
	11	Neuralgia.....	24	2.8	Whooping-cough.....	10	2.6	Inflam. of kidney.....	12	2.1
	12	Pneumonia.....	25	3.1	Scarlet fever.....	24	4.6	Dysentery.....	3	1.6
	13	Typho-mal. fever.....	1	1.5	Cholera morbus.....	16	4.1	Measles.....	4	1.8
	14	Membranous croup.....	.7	1.5	Inflam. of kidney.....	32	6.6	Cholera infantum.....	5	1.9
Less than said average.	(15)	Average.....	15	2.6						
	15	Intermittent fever.....	2	2.3	Typhoid fever (ent.)....	21	5.2	Smallpox.....	3	2.0
More sickness than av. for 28 diseases.		NORTHERN CENTRAL DIVISION.†			WESTERN DIVI- SION.†			NORTHEASTERN DIVISION.†		
	1	Rheumatism.....	71	1.7	Rheumatism.....	61	2.1	Influenza.....	100	1.0
	2	Bronchitis.....	51	2.5	Influenza.....	46	2.0	Neuralgia.....	100	2.4
	3	Neuralgia.....	49	2.5	Tonsillitis.....	53	2.6	Rheumatism.....	100	3.0
	4	Tonsillitis.....	43	3.3	Neuralgia.....	53	2.6	Inflam. of kidney.....	100	3.2
	5	Diarrhea.....	33	2.6	Bronchitis.....	49	2.9	Bronchitis.....	100	4.0
	6	Influenza.....	23	2.9	Diarrhea.....	34	2.5	Tonsillitis.....	98	4.7
	7	Typho-mal. fever.....	.4	1.0	Intermittent fever.....	20	2.2	Erysipelas.....	96	4.8
	8	Intermittent fever.....	13	2.3	Measles.....	9	2.0	Pleuritis.....	100	5.0
	9	Cholera morbus.....	6	2.0	Smallpox.....	10	2.2	Inflam. of bowels.....	79	5.0
	(10)	Average.....	15	2.9				Average.....	37	3.9
	10	Scarlet fever.....	14	3.1	Consumption, pul.....	12	2.3	Diarrhea.....	50	4.8
	11	Measles.....	8	2.6	Meningitis.....	.2	2.0	Whooping-cough.....	17	3.6
	12	Consumption, pul.....	25	4.1	Remittent fever.....	15	2.5	Smallpox.....	29	4.2
	(13)				Average.....	17	2.6			
Less than said average.	13	Cholera infantum.....	6	2.6	Whooping-cough.....	3	2.2	Pneumonia.....	44	4.9
	14	Typhoid fever (ent.)....	12	3.2	Diphtheria.....	5	2.3	Inflam. of brain.....	10	5.0
	15	Erysipelas.....	6	2.7	Pneumonia.....	19	2.8	Cholera morbus.....	10	5.0

TABLE 10.—CONCLUDED.

	Order.*	Diseases in order of apparent amount of sickness. Most prevalent disease first.	Per cent of reports stat- ing presence of, d	Av. order of prevalence when present. e	Diseases in order of apparent amount of sickness. Most prevalent disease first.	Per cent of reports stat- ing presence of, d	Av. order of prevalence when present. e	Diseases in order of apparent amount of sickness. Most prevalent disease first.	Per cent of reports stat- ing presence of, d	Av. order of prevalence when present. e
More sickness than av. for 28 diseases.		BAY AND EASTERN DIVISION.†			CENTRAL DIVISION.†			SOUTHWESTERN DIVISION.†		
	1	Rheumatism.....	41	2.1	Rheumatism.....	57	2.1	Rheumatism.....	71	2.2
	2	Neuralgia.....	35	2.4	Neuralgia.....	47	2.4	Tonsillitis.....	66	2.8
	3	Influenza.....	29	1.8	Influenza.....	37	1.9	Neuralgia.....	62	2.7
	4	Bronchitis.....	33	2.4	Bronchitis.....	44	2.5	Influenza.....	46	2.0
	5	Diarrhea.....	27	2.7	Tonsillitis.....	43	2.5	Bronchitis.....	59	2.7
	6	Tonsillitis.....	28	2.9	Diarrhea.....	29	2.3	Diarrhea.....	47	2.8
	7	Typhoid fever (ent.).....	11	1.6	Typhoid fever (ent.).....	17	2.6	Intermittent fever.....	37	3.0
	8	Scarlet fever.....	13	2.5	Whooping-cough.....	6	1.8	Membranous croup.....	5	2.0
	(9)	Average.....	13	2.9				Average.....	21	3.3
	9	Inflam. of kidney.....	20	3.8	Inflam. of kidney.....	22	3.4	Cholera morbus.....	10	2.9
	(10)				Average.....	16	2.9			
	10	Pneumonia.....	17	3.5	Consumption, pul.....	21	3.5	Cholera infantum.....	12	3.4
	11	Cholera morbus.....	9	2.7	Measles.....	12	2.8	Remittent fever.....	11	3.5
	12	Typho-mal. fever.....	3	2.1	Scarlet fever.....	14	3.2	Pleuritis.....	21	4.1
Less.	13	Smallpox.....	9	2.9	Puerperal fever.....	5	2.2	Inflam. of kidney.....	19	4.1
	14	Pleuritis.....	16	3.8	Dysentery.....	10	3.3	Smallpox.....	6	3.5
	15	Whooping-cough.....	2	2.4	Smallpox.....	8	3.3	Diphtheria.....	4	3.5
		SOUTHERN CENTRAL DIVISION.†			SOUTHEASTERN DIVISION.†					
	1	Rheumatism.....	59	2.3	Rheumatism.....				49	1.9
	2	Bronchitis.....	52	2.4	Bronchitis.....				46	1.8
	3	Neuralgia.....	54	2.5	Neuralgia.....				39	2.2
	4	Influenza.....	42	2.0	Tonsillitis.....				35	2.1
	5	Tonsillitis.....	50	2.7	Diarrhea.....				30	2.0
	6	Consumption, pul.....	24	2.3	Influenza.....				27	2.0
	7	Diarrhea.....	25	2.7	Whooping-cough.....				9	1.8
	8	Measles.....	11	2.5	Smallpox.....				8	1.8
	(9)	Average.....	16	2.8						
	9	Scarlet fever.....	9	2.9	Typhoid fever (enteric).....				7	1.8
	10	Whooping-cough.....	8	2.8	Consumption, pulmonary.....				15	2.1
11	Pneumonia.....	15	3.5	Scarlet fever.....				15	2.1	
(12)				Average.....				14	2.1	
12	Dysentery.....	4	3.0	Pleuritis.....				23	2.5	
13	Cholera morbus.....	8	3.3	Pneumonia.....				12	2.1	
14	Cholera infantum.....	2	3.1	Inflammation of kidney.....				20	2.4	
15	Typhoid fever (ent.).....	9	3.5	Measles.....				8	2.1	

\* , d, e. Foot-notes with these marks are under Table 9.

† The counties in each division are shown on maps of the State, on pages 201 and 217 of the report of this Board for 1886.

TABLE 11.—Showing comparisons between the averages of certain meteorological conditions at stations in Michigan in 1903, with those in preceding years. (Abstracted from the article on Principal Meteorological Conditions in Michigan, on preceding pages of this report.)

Meteorological conditions.	Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average temperature.....			2.87	7.98		.77					.10		
In 1903 higher than av. for 10 years, 1893-1902.....					1.99		6.07	2.21	4.72	1.67		2.74	6.00
Lower.....	1.16	.31									.14	.58	.64
Av. daily range of temperature.....						.74							
In 1903 greater than av. for 10 years, 1893-1902.....					1.19		3.42	1.43	4.36	.53			
Less.....	.97	.78	.43	1.58		.04							
Absolute humidity.....			.07	.59									
In 1903 more than av. for 10 years, 1893-1902.....		.10			.22		.75	.14	.38	.08	.12	.35	.46
Less.....	.16												
Relative humidity.....							3		5				
In 1903 more than av. for 10 years, 1893-1902.....		2	2										
Less.....					2	6				10	3	2	
Cloudiness.....													
In 1903 greater than av. for 10 years, 1893-1902.....		3		7			17	6	19	1	8	12	
Less.....	2				2	12							4
Rainfall.....													
In 1903 more than av. for 10 years, 1893-1902.....	4.61		.89		.83		.53	1.43	2.57	.50	.62	.28	.01
Less.....		.49		.22		.55							
Day ozone.....							.01						.12
In 1903 more than av. for 10 years, 1893-1902.....		.84	.39	.79	.62	.33		.52	.56	.57	.48	.76	
Less.....	.48						.09						
Night ozone.....													
In 1903 more than av. for 10 years, 1893-1902.....		.67	.41	.68	.58	.04		.34	.54	.50	.28	.74	.42
Less.....	.43												
Velocity of wind.....													
In 1903 greater than av. for 10 years, 1893-1902.....	.1	.1	.7		1.2			.3	.6	.5	.5	.5	.7
Less.....				1.7		.3	.5					.2	
Atmospheric pressure.....						.082				.010			
In 1903 greater than av. for 10 years, 1893-1902.....				.116									
Less.....	.034	.137	.002		.127		.040	.058	.057		.033	.042	.105

TABLE 12.—BRONCHITIS.—*Stating for the year and for each month of the year 1903, what per cent of the weekly reports of sickness stated presence of bronchitis, and what were the meteorological conditions as observed at stations in Michigan.\**

Bronchitis.		Temperature, F.		Humidity of air, § Av. of 3 daily observations.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, troy ounces.		Ozone, relative. Scale of 10°.		Average velocity of wind, miles per hour by anemometer.		Atmospheric pressure, inches. Reduced to 32° F.				
Months in order of greatest per cent of weekly reports stating presence of.	Per cent of weekly reports stating presence of.	Average order of prevalence where present.†, ‡	Average daily range by registering thermometers.	Average of three daily observations.	Relative per cent of saturation.	Absolute—grains of vapor in a cubic foot of air.	Inhaled.¶	Exhaled in excess of that inhaled.¶	Average per cent of cloudiness.	Day observation, 7 A. M. to 2 P. M.	Night observation, 9 P. M. to 7 A. M.	Average velocity of wind, miles per hour by anemometer.	Range.			
													Monthly and for year.	Av. daily by 3 daily observations.**	Average pressure.	
More than av. per cent of bronchitis.	Jan.....	59	2.4	13.42	22.74	84	1.35	.84	10.84	75	a 3.14	a 3.30	11.2	1.279	.263	28.961
	Feb.....	58	2.5	15.67	23.74	83	1.40	.88	10.80	63	3.73	4.07	11.8	1.273	.359	b 29.081
	March.....	58	2.4	15.17	39.45	79	2.49	1.56	10.12	65	3.43	3.96	a 10.0	a .798	a .192	b 29.203
	April.....	57	2.5	17.28	44.39	a 71	2.76	1.73	9.95	a 51	a 3.17	3.76	11.7	.975	.210	28.994
	Dec.....	53	2.3	13.36	21.26	87	1.24	.78	10.90	77	3.64	3.64	11.8	.932	.265	28.998
	Nov.....	49	2.3	14.46	34.55	79	2.06	1.26	10.42	58	a 2.43	a 2.81	10.9	1.256	.247	b 29.084
Average.....		48	2.5	16.82	45.98	77	3.38	2.11	9.57	57	3.18	3.61	10.1	.896	.197	29.073
Less than av. per cent of bronchitis.	May.....	46	2.5	20.75	58.23	68	4.27	2.67	9.01	39	a 3.76	a 4.60	9.3	.797	.132	29.154
	Oct.....	42	2.4	18.32	50.74	74	3.50	2.19	9.49	43	2.64	3.08	a 10.4	.879	.190	29.109
	Sept.....	41	2.7	19.47	60.73	76	4.95	3.09	8.59	46	2.45	2.80	9.6	.654	.138	29.154
	June.....	40	2.6	17.90	61.38	76	4.87	3.04	8.64	a 58	a 3.74	a 4.40	7.9	.707	.120	b 29.034
	August.....	39	2.9	16.50	64.69	a 79	5.57	3.48	8.20	a 59	a 3.44	a 3.65	8.2	.590	.128	b 29.058
	July.....	36	2.8	19.52	69.84	73	6.15	3.84	7.84	47	2.61	3.31	8.4	.610	.125	b 29.042

\*Statements relative to meteorological conditions may be found in an article on the principal meteorological conditions in Michigan in 1903, on preceding pages of this report.

†Explanations of statements in this and the preceding columns, and other statements relative to the prevalence in 1903, of the diseases under consideration, may be found in Tables 5 and 6 of this article, and also in Diagrams 1, 2, 3, 4 and 5. When the per cent of reports stated for any disease is the same for two months or for any month is the same as the average, the order of months in the first column of these exhibits has been determined by reference to fractional per cents.

‡Small numbers in this column indicate great prevalence in the localities where the disease occurred, as compared with other diseases; and large numbers a less prevalence.

§Calculated from readings of dry bulb and wet bulb thermometers.

||Calculated for 18 respirations per minute, of 20 cubic inches of air each.

¶Assuming the air exhaled to be saturated with vapor at the temperature of 98° F., in which case each cubic foot of air contains 18.69 grains of vapor, and 18 respirations per minute, of 20 cubic inches of air each, make 11.68 troy ounces of vapor exhaled daily. No correction has been made for the expansion of air after it is inhaled.

\*\*The daily range from which numbers in this column were computed is the difference between the highest and the lowest of the four observations taken during the 24 hours, namely, at 7 a. m., 2 p. m., 9 p. m. of one day, and 7 a. m. of the following day.

a An exception to the proposition that more than the average per cent of weekly reports stated presence of bronchitis in months when the meteorological condition named at the head of the column was greater than the average for the year, and less in months when the same condition was less than the average. Proposition 1, relating to bronchitis and other "cold-weather" diseases, is on a preceding page in this article.

b An exception to the proposition that more than the average per cent of weekly reports stated presence of bronchitis in months when the meteorological condition named at the head of the column was less than the average for the year, and less in months when the same condition was greater than the average for the year. Proposition 2, relating to bronchitis and other "cold-weather" diseases, is on a preceding page in this article.



TABLE 13.—By year and months for 1903, and for the preceding year, and an average for the 10 years, 1893-1902, stating on what per cent of the weekly reports received PNEUMONIA, MEMBRANOUS CROUP, DIPHTHERIA, RHEUMATISM, INFLUENZA, SCARLET FEVER, NEURALGIA, TONSILLITIS, BRONCHITIS, INFLAMMATION OF KIDNEY, MENINGITIS, PLEURITIS, CONSUMPTION, PUERPERAL FEVER, ERYSIPELAS AND SMALLPOX, were reported present; and comparing the per cents for months in 1903 with the averages for corresponding months in the years specified. (The per cent of increase or decrease of any disease in 1903 when compared with the average for the preceding 10 years, may be found by multiplying the difference by 100, and dividing the product by the figure representing the average.)

Years, etc.														Year.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.		Year.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Pneumonia.	Av. 10 years, 1893-1902....	19	32	36	35	29	20	11	6	5	7	10	18	23	Memb. group.	1	1	2	1	1	5	4	3	4	1	2	1	1902.....	19	32	35	32	26	19	10	9	4	9	10	20	27	5	5	1	7	0	4	7	0	2	4	4	9																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	1903.....	17	29	30	32	30	20	12	7	5	7	10	14	21		4	9	2	0	5	2	2	6	2	6	1	2		In 1903 greater than av. 1893-1902.....	17	29	30	32	30	20	12	7	5	7	10	14	21	4	9	2	0	5	2	2	6	2	6	1	2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	In 1903 less than av. 1893-1902.....	2	3	6	3	..	..	..	..	..	..	..	..	..		4	2	..	..	..	..	..	..	..	..	..	..			..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

TABLE 13.—CONCLUDED.

Years, etc.		Year.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.		Year.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
Meningitis.	Av. 10 years, 1893-1902....	1	1	2	2	2	2	2	1	2	1	1	1	1	Pleuritis.	16	22	23	24	21	17	13	11	8	10	12	16	19
	1902.....	1	1	2	1	3	3	4	2	1	1	1	1	1		18	25	27	27	23	16	15	10	8	10	12	16	23
	1903.....	9	1	7	2	1	1	1	8	6	1	1	0	2		15	20	20	19	18	12	10	12	13	15	11	15	21
	In 1903 greater than av. in 1893-1902.....	=	=	=	=	=	=	=	=	=	=	=	=	1		=	=	=	=	=	=	1	5	5	=	=	=	2
	In 1903 less than av. in 1893-1902.....	1	=	1.3	1.8	1	1	1	2	4	1	=	9	=		1	2	3	5	3	5	3	=	=	=	1	1	=
Consumption.	Av. 10 years, 1893-1902....	26	25	25	26	27	27	26	26	25	25	24	24	23	Puerperal fever.	2	3	3	3	3	3	2	2	2	2	2	2	2
	1902.....	20	22	20	20	20	19	19	19	19	19	21	20	19		1	3	3	1	1	1	4	8	1	2	1	7	7
	1903.....	20	17	18	18	15	21	22	21	18	22	22	22	21		1	2	3	1	5	7	1	2	2	1	6	7	8
	In 1903 greater than av. in 1893-1902.....	=	=	=	=	=	=	=	=	=	=	=	=	=		=	=	=	=	=	=	=	=	=	=	=	=	=
	In 1903 less than av. in 1893-1902.....	6	8	7	8	12	6	4	5	7	3	2	2	2		1	1	=	2	2.5	2.3	1	=	=	1	4	1.3	1.2
Erysipelas.	Av. 10 years, 1893-1902....	12	12	13	13	14	13	12	11	9	9	10	11	14	Smallpox.	2	2	2	3	3	2	2	1	1	7	7	2	2
	1902.....	9	12	10	8	11	9	8	10	7	6	9	9	13		8	12	13	17	14	11	7	5	4	2	1	3	8
	1903.....	8	12	12	9	10	10	5	6	8	5	5	8	9		7	15	13	10	11	8	6	5	6	5	9	2	4
	In 1903 greater than av. in 1893-1902.....	=	=	=	=	=	=	=	=	=	=	=	=	=		5	13	11	7	8	6	4	4	5	4	3	2	=
	In 1903 less than av. in 1893-1902.....	4	=	1	4	4	3	7	5	1	4	5	3	5		=	=	=	=	=	=	=	=	=	=	=	=	=

The lines for 1903 in Tables 13 and 14, relative to the twenty-eight diseases, are graphically represented in Diagrams 1, 2, 3, 4 and 5 of this article.

Table 10 reveals the fact that the sickness from some diseases differs very much in the several divisions of the State. Thus in the Upper Peninsula consumption caused more sickness than any other disease; in the Northwestern Division it was ninth on the list; in the Northern, it was seventh; in the Northern Central Division it was twelfth; in the Western, Central and Southeastern Divisions it was tenth; in the Southern Central Division it was sixth; and in the Northeastern, Bay and Eastern and Southwestern Divisions it was not among the fifteen diseases which caused most sickness.

## CLIMATE AND SICKNESS.\*

Table 12 (and similar tables or "exhibits" in previous reports) is an attempt to learn something of the relations of bronchitis to meteorological conditions, by noting whether each meteorological condition was above or below its average for the year, in months when more or in months when less bronchitis than the average for the year was reported. The months are arranged in order according to the prevalence of bronchitis; those months in which most bronchitis was reported being placed first in the column; those in which more bronchitis than the average was reported are placed above the average line; the others below that line. The meteorological conditions for each month are printed, in the proper columns, in the line for the month. The statements being thus arranged, it is easy to see whether the temperature, the velocity of the wind, or any other condition represented, was above

\* Foot-note is at bottom of page 94.



its annual average in months when more than the average amount of bronchitis was reported, or *vice versa*.

That the comparisons may the more readily be held in mind, propositions have been made concerning the relations of bronchitis to meteorological conditions, grouping the conditions into two classes. The letters *a* and *b* in the table mark exceptions to these propositions. It is not supposed that the propositions are in every case true concerning the disease; but the propositions serve to bring out the evidence of the table on the subject in question. This evidence is appreciated by noting the number and force of the exceptions to the propositions, and also whether the exception is explained by facts shown in other columns. A summary of the evidence is presented in Table 15 near the close of this article.

Propositions similar to those relative to bronchitis, but relating to other diseases, are given on following pages. The propositions are differently stated for the summer diseases and for the winter diseases, but they are not changed to fit the individual diseases under each class.

In studying the propositions, it may be held in mind that the changes in prevalence of most diseases occur a month or more later than the changes in the atmospheric conditions.

*Relations of bronchitis and other "cold-weather" diseases to meteorological conditions.\**

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of bronchitis, pneumonia, membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis, pulmonary consumption, meningitis, erysipelas, inflammation of kidney, puerperal fever, smallpox, or average disease, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, the monthly and the average daily range of the barometer, were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of bronchitis (or of the other diseases named), these conditions were **less** than the average for the year. In Table 12, the letter *a* marks exceptions to this proposition relating to bronchitis for the year 1903.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of bronchitis, pneumonia, membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis, pulmonary consumption, meningitis, erysipelas, inflammation of kidney, puerperal fever, smallpox, or average disease, the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere and the average daily pressure of the atmosphere were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of bronchitis (or of the other diseases named), these conditions were **greater** than the average for the year. In Table 12, the letter *b* marks exceptions to this proposition relating to bronchitis for months in 1903.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to proposition 2, it is true, also, that the quantity of vapor inhaled daily was **less** than the average, and the quantity exhaled daily in excess of that inhaled was **greater** than the average in months where **more** than the average per cent of reports stated presence of bronchitis, or of the other diseases named in propositions 1 and 2;

\* A comparison of meteorological conditions in 1903 with the averages for series of years, is given on a preceding page of this article.



and that **more** vapor was inhaled and a **less** excess exhaled daily in months when the per cent of reports stating presence of bronchitis, or of the other diseases named in propositions 1 and 2, was **less** than the average.

What per cent of the weekly reports received stated presence of the diseases mentioned in the preceding propositions by months in the years 1893-1903, is stated in Tables 13 and 17, on subsequent pages of this article.

For the preparation of Tables 15 and 16 in this article, tables similar to Table 12 relating to bronchitis have been prepared for the other twenty-seven diseases which are considered in this article, but on account of lack of space, are not printed.

*Relations of diarrhea and other "warm-weather" diseases to meteorological conditions.\**

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of diarrhea, cholera infantum, intermittent fever, remittent fever, typhoid fever, typho-malarial fever, cholera morbus, dysentery, measles, whooping-cough, inflammation of brain, or inflammation of bowels, the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere, and the average daily pressure of the atmosphere were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of diarrhea (or of the other diseases named), these conditions were **less** than the average for the year.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of diarrhea, cholera infantum, intermittent fever, remittent fever, typhoid fever, typho-malarial fever, cholera morbus, dysentery, measles, whooping-cough, inflammation of brain, or inflammation of bowels, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, and the monthly and average daily range of the barometer were **less** than the average for the year; and that in months when **less** than the average per cent of reports stated the presence of diarrhea (or of the other diseases named), these conditions were **greater** than the average for the year.

Explanations of propositions 1 and 2 are given on a preceding page, under the heading "Climate and Sickness.

A summary relative to the foregoing propositions, is presented in Table 16, near the close of this article.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to proposition 1, it is true, also, that the quantity of vapor inhaled daily was **greater** than the average, and the quantity exhaled daily in excess of that inhaled was **less** than the average in months when **more** than the average per cent of reports stated presence of diarrhea, or of the other diseases named in propositions 1 and 2; and that **less** vapor was inhaled and a **greater** excess exhaled daily in months when the per cent of reports stating presence of diarrhea, or of the other diseases named in propositions 1 and 2 was **less** than the average.

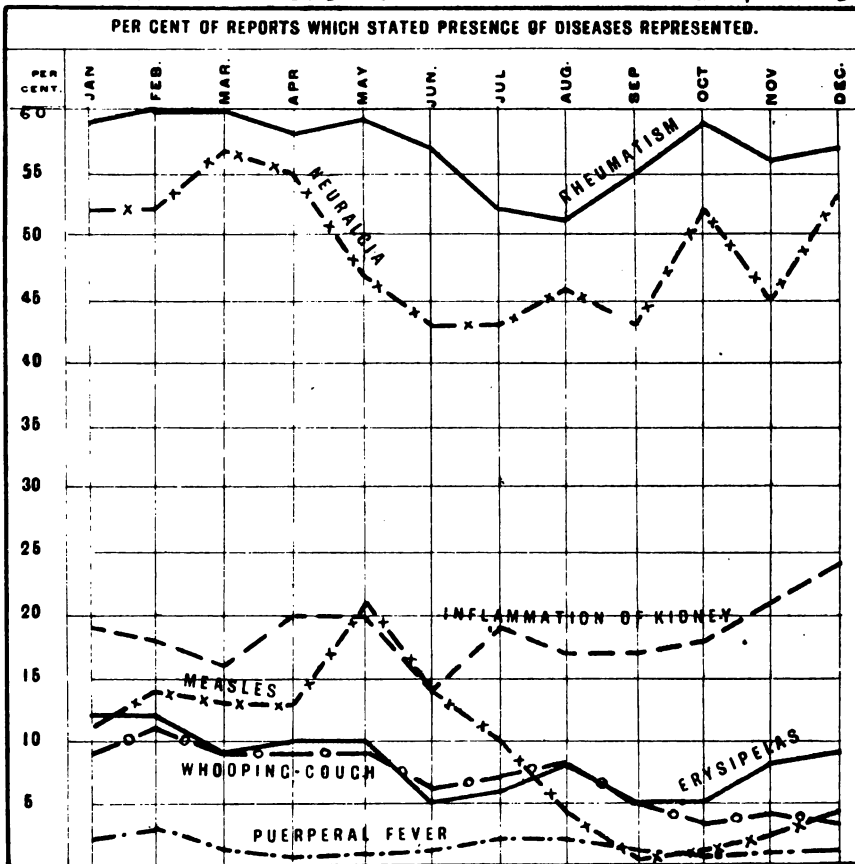
On what per cent of the weekly reports received, by months in the years 1893-1903, the twelve foregoing diseases were reported present, is stated in Table 14, on subsequent page of this article.

The lines for 1903, relative to the twelve diseases, are graphically represented in Diagrams 1, 3, 4 and 5 in this article.

\* A comparison of meteorological conditions in 1903, with the average for series of years, is given on a preceding page of this article.



DIAGRAM 3—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1903.



[PLATE 1223.]

TABLE 14.—By year and months for 1903 and for the preceding year, and averages for the 10 years, 1893-1902; stating on what per cent of the weekly reports received DIARRHEA, CHOLERA INFANTUM, INTERMITTENT FEVER, REMITTENT FEVER, TYPHOID FEVER, TYPHO-MALARIAL FEVER, MEASLES, WHOOPING-COUGH, CHOLERA MORBUS, DYSENTERY, INFLAMMATION OF BRAIN AND INFLAMMATION OF BOWELS, were reported present, and comparing the per cents for 1903 with the averages for corresponding months in the years specified. (The per cent of increase or decrease of any disease in 1903, when compared with the average for the preceding 10 years, may be found by multiplying the difference by 100, and dividing the product by the figure representing the average.)

Years, etc.	Year.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Year.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.		
Diarrhea.	(Av. 10 years, 1893-1902.....	37	22	20	22	24	25	35	53	68	48	28	23	Cholera infantum.	9	1	7	6	1	2	7	18	30	29	11	1	.6	
	1902.....	33	24	22	23	22	23	30	48	57	37	27	25		5	2	9	2	9	1	2	12	21	17	5	7	.4	
	1903.....	31	20	18	18	20	23	24	41	55	57	43	25		20	5	4	4	1	5	2	3	8	19	18	6	7	2
	In 1903 greater than av. 1893-1902.....																											1
	In 1903 less than av. 1893-1902.....	6	2	2	4	4	2	11	12	13	11	5	3		3	4	.6	.3		.5		4	10	11	11	5	.3	...
Intermittent fever.	(Av. 10 years, 1893-1902.....	19	13	12	14	18	19	20	21	23	24	23	19	14	Remittent fever.	14	11	10	10	11	12	14	15	17	19	18	15	12
	1902.....	13	9	11	10	13	14	14	15	15	16	13	10	7		7	5	6	5	8	8	9	6	10	8	8	6	5
	1903.....	12	11	11	10	12	12	11	16	15	14	16	10	10		6	5	8	5	6	8	7	6	7	8	8	5	4
	In 1903 greater than av. 1893-1902.....																											
	In 1903 less than av. 1893-1902.....	7	2	1	4	6	7	9	5	8	10	7	9	4		8	6	2	5	5	4	7	9	10	11	10	10	8
Typhoid fever.	(Av. 10 years, 1893-1902.....	11	8	6	5	5	4	5	8	15	20	22	18	12	Typho-mal. fever.	2	2	1	1	9	.9	.8	3	4	5	5	4	2
	1902.....	12	10	6	7	6	9	9	10	15	21	19	14	14		2	2	1	9	0	4	1	2	2	3	2	4	1
	1903.....	13	11	7	8	10	6	6	9	17	21	21	18	15		2	1	4	2	5	1	2	6	1	2	4	3	2
	In 1903 greater than av. 1893-1902.....	2	3	1	3	5	2	1	1	2	1			3					1		1	1	2					
	In 1903 less than av. 1893-1902.....										1																	
Measles.	(Av. 10 years, 1893-1902.....	8	6	8	12	15	17	15	9	4	3	2	3	5	Whooping-cough.	7	6	6	6	6	7	7	8	7	7	5	6	7
	1902.....	10	9	12	13	17	17	16	11	3	4	4	6	9		7	6	6	4	4	6	8	9	7	8	8	7	9
	1903.....	9	11	14	13	13	21	14	10	4	.3	1	2	4		7	9	11	9	9	9	6	7	8	5	3	4	3
	In 1903 greater than av. 1893-1902.....	1	5	6	1		4		1										3	5	3	3	2		1			
	In 1903 less than av. 1893-1902.....				2		1		2.7	1	1	1	1									1	1		2	2	2	4
Cholera morbus.	(Av. 10 years, 1893-1902.....	12	3	3	3	3	5	11	25	34	31	13	4	3	Dysentery.	12	4	4	4	4	4	7	18	32	33	19	6	3
	1902.....	8	2	3	3	3	9	3	8	18	27	17	7	4		7	4	4	4	3	3	4	9	18	16	8	2	3
	1903.....	8	1	2	3	1	4	5	13	21	21	11	4	6		7	2	2	2	1	2	2	8	21	21	14	4	2
	In 1903 greater than av. 1893-1902.....																											
	In 1903 less than av. 1893-1902.....	4	2	1		2	1	6	12	13	10	2		2.4		5	2	2	2	3	2	5	10	11	12	5	2	1
Inflam. of brain.	(Av. 10 years, 1893-1902.....	2	2	3	2	3	2	2	2	2	2	2	2	2	Inflam. of bowels.	11	9	9	10	10	9	11	12	16	14	11	8	9
	1902.....	1	2	9	7	4	2	1	1	.8	1	2	2	1		9	10	12	12	7	9	8	8	11	12	8	8	10
	1903.....	1	2	9	1	1	1	2	2	2	2	4	9	1		9	8	9	8	10	9	8	10	12	12	9	7	6
	In 1903 greater than av. 1893-1902.....																											
	In 1903 less than av. 1893-1902.....	1		2.1	1	2	1					1.6	1.1	1		2	1		2				3	2	4	2	2	1

## COLD-WEATHER DISEASES.

TABLE 15—Summary relative to propositions on preceding pages concerning relations by months, in 1903, between greater or less than usual prevalence of diseases named and certain given coincident climatic conditions.

Diseases.	Months (inclusive) in which diseases named were more than usually prevalent in 1903.	Months (inclusive) in which diseases named were less than usually prevalent in 1903.	For the 12 months of the year 1903. Number of months in which propositions held true.*											
			That in months when diseases named were more than usually prevalent the conditions named below were greater than usual, and in months when less than usually prevalent these conditions were less than usual.								That in mos. when diseases named were more than usually prevalent the conditions named below were lower than usual, and in months when the diseases were less than usually prevalent these conditions were higher than usual.			
			Relative humidity.	Av. per cent of cloudiness.		Ozone.		Velocity of wind.	Atmospheric pressure.		Average temperature.	Av. daily range of temp.	Average daily atmospheric pressure.	Absolute humidity.
				Day.	Night.	Day.	Night.		Monthly.	Av. daily.				
Bronchitis.....	Jan., Apr., Nov., Dec.	May-Oct.....	10	9	6	7	10	11	11	12	10	6	12	
Pneumonia.....	Jan.-May, Dec....	June-Nov.....	8	7	8	9	8	9	9	10	8	6	10	
Membranous croup.....	Jan., May, Aug., Oct., Nov.	Feb.-April, Dec., June, July, Sept.	7	6	5	4	7	6	6	5	7	5	5	
Diphtheria.....	Feb., Oct.-Dec....	Mar., May, July, Sept.	†6	6	4	4	9	8	8	7	6	4	7	
Tonsillitis.....	Jan.-May, Nov., Dec.	June-Oct.....	9	8	7	8	9	10	10	11	9	5	11	
Influenza.....	Jan.-April, Dec....	May-November...	9	8	7	8	9	10	10	11	9	7	11	
Scarlet fever.....	Jan.-May, Dec....	July-Sept., Nov....	†6	6	7	8	7	7	7	8	6	5	8	
Rheumatism.....	Jan.-May, Oct....	July-Sept., Nov....	†5	5	6	7	7	6	6	7	5	4	7	
Neuralgia.....	Jan.-April, Oct., Dec.	May-Sept., Nov....	8	7	6	7	10	9	9	10	8	6	10	
Consumption, pul.....	May-July, Sept.-Dec.	Jan., April-Aug....	3	4	5	4	5	4	4	3	3	5	3	
Pleuritis.....	Jan.-April, Dec....	May-Aug., Oct....	†8	7	5	6	8	9	9	10	8	5	10	
Inflammation of kidney...	Jan., April, May, Nov., Dec.	Feb., March, June, Aug.-Oct.	†6	5	4	5	8	9	9	8	6	7	8	
Meningitis.....	Jan., April-June, Sept., Oct., Dec.	Feb., March, July, Aug., Nov.	3	4	5	6	7	6	6	5	3	7	5	
Puerperal fever.....	Jan., Feb., July, Aug.	April, May, Oct.-Dec.	†6	6	5	4	3	4	4	4	6	6	4	
Erysipelas.....	Jan.-May, Dec....	June, July, Sept., Oct.	†8	7	7	8	7	8	8	9	8	5	9	
Smallpox.....	Jan.-May.....	June-Dec.....	7	6	7	8	7	9	8	9	7	5	9	

\* When not otherwise specified, the figures in each of these eleven columns show for how many months out of the twelve months in 1903, the proposition named over the column holds true; thus, concerning bronchitis, the proposition relative to average daily range of temperature held true in ten months out of the twelve; that relative to average temperature, in each of the twelve, etc. Most of the cold-weather diseases usually reach a maximum prevalence one month or more later than the coldest month, and the changes in prevalence lag behind the temperature changes in the several months.

† The figures opposite these diseases are the number of months in which the propositions held true in periods of less than twelve months, because in some months the diseases were neither more or less prevalent than the average; thus for diphtheria a period of nine months is used, scarlet fever ten months, rheumatism ten months, pleuritis ten months, inflammation of kidney eleven months, puerperal fever nine months, and erysipelas ten months.



## WARM-WEATHER DISEASES.

TABLE 16.—Summary relative to propositions on preceding pages concerning relations by months, in 1903, between greater or less than usual prevalence of diseases named, and certain given coincident climatic conditions.

Diseases.	Months (inclusive) in which diseases named were more than usually prevalent in 1903.	Months (inclusive) in which diseases named were less than usually prevalent in 1903.	For the 12 months of the year 1903. Number of months in which propositions hold true.*										
			That in months when diseases named were more prevalent than usual, the conditions named below were higher than usual; and in months when the diseases were less prevalent than usual, these conditions were lower than usual.						That in months when diseases named were more prevalent than usual, the conditions named below were less than usual; and in months when the diseases were less prevalent than usual, these conditions were greater than usual.				
			Average temperature.	Average daily range of temperature.	Absolute humidity.	Average daily atmospheric pressure.	Atmospheric pressure.		Relative humidity.	Average per cent of cloudiness.	Ozone.		Velocity of wind.
							Range.				Day.	Night.	
			Monthly.	Av. daily.									
Diarrhea.....	July-Oct.....	Jan.-June, Nov., Dec.	10	8	10	6	9	9	8	9	8	9	8
Cholera infantum.....	July-October.....	Jan.-June, Nov., Dec.	10	8	10	6	9	9	8	9	8	9	8
Intermittent fever.....	July-October.....	Jan.-March, June, Nov., Dec.	†9	8	9	5	8	8	8	9	7	7	7
Remittent fever.....	Feb., May, June, Aug.-Oct.	Jan., March, Nov., Dec.	†9	8	9	6	8	8	8	7	4	4	7
Typhoid fever (enteric)...	August-Dec.....	January-July.....	7	5	7	7	6	6	5	6	7	8	5
Typho-malarial fever....	Oct., November...	Jan., Feb., April, May, July, Aug.	†4	4	4	6	4	4	4	4	5	6	3
Measles.....	January-July.....	August-Dec.....	5	7	5	5	6	6	7	6	5	4	7
Whooping-cough.....	Jan.-May, Aug....	June, Sept.-Dec....	†4	4	4	5	5	5	4	5	4	3	6
Cholera morbus.....	July-October.....	Jan.-June, Nov., Dec.	10	8	10	6	9	9	8	9	8	9	8
Dysentery.....	July-October.....	Jan.-June, Nov., Dec.	10	8	10	6	9	9	8	9	8	9	8
Inflammation of brain....	Jan., June-Sept....	Feb., Oct., Nov....	†6	5	6	1	6	6	5	4	4	4	7
Inflammation of bowels...	April, July-Sept...	Jan., March, June, Nov., Dec.	†7	7	7	4	6	6	7	8	6	5	6

\* When not otherwise specified, the figures in each of these eleven columns show for how many months out of the twelve months in 1903, the proposition named over the column holds true, thus, concerning diarrhea, the proposition relative to average daily range of temperature held true in eight months out of the twelve; that relative to absolute humidity, ten months out of the twelve, etc. Most of the warm-weather diseases usually reach a maximum prevalence about one month later than the warmest month; and the changes in prevalence usually follow about a month later than the changes in temperature.

† The figures opposite these diseases are the number of months in which the propositions held true in periods of less than twelve months, because in some months the diseases were neither more or less prevalent than the average; thus, for intermittent fever a period of ten months is used, remittent fever ten months, typho-malarial fever eight months, whooping-cough eleven months, inflammation of brain eight months, and inflammation of bowels nine months.

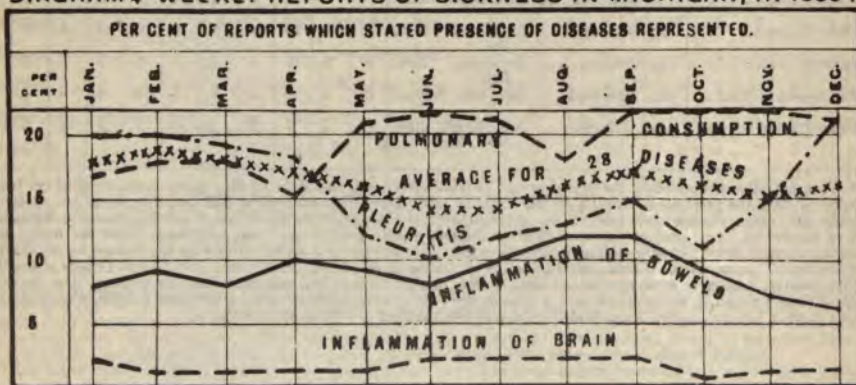


*Total sickness—average disease.*—"Average disease" is an average of the tabulated diseases reported present on all the cards received and compiled at this office during the year. It is probably equivalent to the actual sickness from all diseases printed on the report cards, and probably represents very nearly the average sickness from all the diseases in the State. A sample of the report cards on which diseases are reported to this office is shown on the third page of this article. Twenty-eight diseases are printed on the cards. In 1903 there were 5,647 of these card reports received. On some of the cards only one or two diseases were reported present, and on others more. Had each disease (printed on this card, and only the twenty-eight thus named) been reported present on every card received at this office, there would have been 158,116 reports of diseases present. (This is the product of 5,647 reports received multiplied by twenty-eight, the number of diseases printed on the cards, or 100 per cent of the possible disease reports.) There were actually present on the cards received at this office only 25,716 disease reports, which  $25,716 \div 158,116$  of the possible disease reports that might have been present, is about 16 per cent. This 16 per cent represents the actual sickness in the State from the tabulated diseases reported present, or in other words, the sickness from "average disease." This is shown, by months, in Diagram 4, on this page.

Table 17 serves to indicate the probable actual sickness in the State from the tabulated diseases in the years 1893-1903. It compares the sickness by months, in 1903 with the sickness in each of the ten years, 1893-1902, and indicates that the sickness reported in 1903 was, for the year, and, with the exception of February, for each month of the year, less than the average.

On this subject Tables 7 and 8, on preceding pages, and the accompanying remarks, may be studied in connection with the tables and remarks in this part of this article. In Table 7, the order of prevalence of each disease, including the "average disease," is shown as it appears after taking account of the order of prevalence of each disease, in the places where it was present, and also the per cent of all reports received on which that disease was reported.

DIAGRAM 4—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1903.

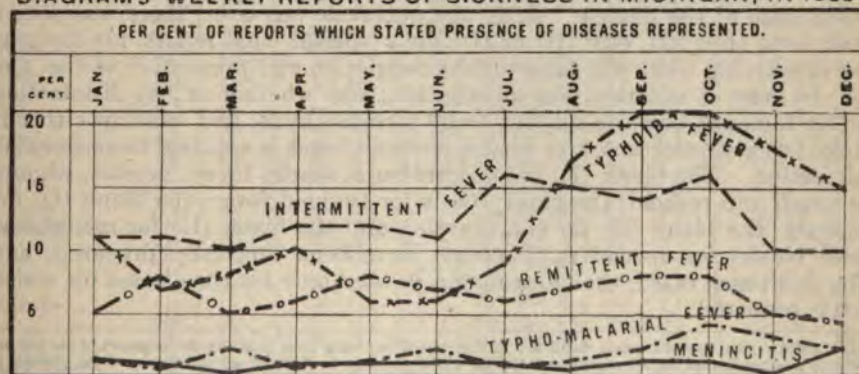


[PLATE 1224.]

TABLE 17.—SICKNESS FROM AVERAGE DISEASE 1893-1903.—By year and months for each of the years, 1893-1903, stating on an average for such of the 28 diseases tabulated as were reported present, what per cent of the weekly reports received stated presence of the diseases; and comparing the average per cents for months in 1903 with the averages for corresponding months in the 10 years, 1893-1902.

Years, etc.	Annual Av.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Average 10 years, 1893-1902.....	18	19	18	20	19	17	16	17	18	18	18	18	18
1893.....	20	21	21	20	20	19	18	18	21	21	20	20	20
1894.....	20	20	19	20	20	19	18	18	20	22	20	19	19
1895.....	20	20	21	22	22	19	18	19	20	19	19	17	18
1896.....	18	19	19	20	17	16	16	17	18	18	17	17	17
1897.....	18	18	18	19	18	17	16	17	18	19	19	17	16
1898.....	17	17	18	17	18	15	14	15	18	18	18	17	18
1899.....	17	18	19	18	18	16	15	17	17	19	17	17	17
1900.....	18	18	19	19	19	18	16	17	19	21	19	18	18
1901.....	18	19	19	20	19	17	16	15	17	10	17	17	18
1902.....	17	19	20	19	17	16	14	15	16	17	16	16	18
1903.....	16	18	19	18	17	16	14	14	16	17	16	15	16
In 1903, greater than average, 1893-1902.....			1										
In 1903, less than average, 1893-1902.....	2	1		2	2	1	2	3	2	1	2	3	2

DIAGRAM 5—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1903.



[PLATE 1225.]



## COMMUNICABLE DISEASES IN MICHIGAN DURING THE YEAR ENDING DECEMBER 31, 1903.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE STATE BOARD  
OF HEALTH.

This paper continues a subject treated for the preceding year on pages 100-248 of the Report of the State Board of Health for the year 1903, and for former years in previous reports.

Whenever information is received at this office that consumption, diphtheria, typhoid fever, scarlet fever, measles, whooping-cough, meningitis, smallpox, German measles (rötheln), rabies or glanders, is present, or has recently been present in any locality in Michigan, a letter is sent to the health officer of the township, city or village in which the disease is reported to be present (if the name of the health officer has been reported to this office; if not, to the president of the board of health), mentioning the reported existence of the disease within his jurisdiction, indicating his duties and powers and the proper measures to be taken in restricting the disease, transmitting documents of instruction relative to the prevention and restriction of the disease, for distribution among the neighbors of families in which the disease is present\*, and asking for a report of the methods employed for the restriction of the disease, and the results of efforts for suppressing it, also the number of cases and deaths in each outbreak. With this letter in each instance, except in case of rabies and glanders, there was sent a blank form (L), or (S for consumption), for the notice of the first case of a dangerous communicable disease, and a blank form (M) for weekly reports during the continuance of the disease. After the outbreak was over, there was sent a blank form (K), (O), (Q), (R) or (U) for a special final report, for the purpose of learning what was done for the restriction and prevention of the disease, by way of isolation and disinfection; also whether or not disinfection was by fumes of burning sulphur or by formaldehyde, and whether either is efficient as a disinfectant, and what quantity of each is required to accomplish disinfection. The blank (K) is for diphtheria, scarlet fever, measles, whooping-cough and rötheln; the blank (O) is for typhoid fever; the blank (Q) for smallpox; the blank (R) for consumption and the blank (U) for meningitis. These blanks for special final reports have been especially prepared, and differ from each other, therefore should be used only for the disease for which each is prepared.

\* It is believed that these documents distributed in this manner are doing great good; for the neighbors of the sick are sufficiently alarmed to read the documents, and are thus led to cooperate in stamping out the disease. Some evidence of the value of this work may be seen further on, in the several articles to which this is an introduction, in tables which show the estimated number of outbreaks of, and cases of sickness from communicable diseases prevented, and lives saved by isolation and disinfection.

In the report of this Board for the year 1895 (pp. 153-174) in the introduction to the articles on the dangerous communicable diseases, are printed tables and diagrams which show the results of restrictive measures recommended by this Board.

TABLE 1.—Number of all places \* in Michigan at which communicable diseases were reported present, also the number of new places † at which each disease was reported present each week in 1903.

Weeks ending Saturday—	Consumption		Diphtheria		Typhoid fever		Scarlet fever		Measles		Whooping-cough		Meningitis		Small-pox	
	All places.	New places.	All places.	New places.	All places.	New places.	All places.	New places.	All places.	New places.	All places.	New places.	All places.	New places.	All places.	New places.
January.....	10.. 237	14	44	14	47	12	95	27	42	15	23	2	3	1	127	35
	17.. 160	6	40	10	50	4	98	20	53	22	25	8	3	0	157	29
	24.. 160	5	37	14	50	13	100	30	49	20	24	4	3	1	179	42
	31.. 164	4	30	7	58	18	102	16	55	18	25	6	3	2	154	25
February.....	7.. 170	2	34	11	55	16	98	31	52	17	27	7	3	0	142	22
	14.. 173	13	43	19	53	8	97	19	52	9	25	3	3	0	121	15
	21.. 172	5	34	6	41	8	90	14	59	16	20	4	0	0	114	18
	28.. 180	8	37	9	43	6	96	16	58	13	29	2	5	2	114	18
March.....	7.. 179	8	32	12	37	9	82	20	52	12	31	5	4	2	116	24
	14.. 168	9	27	10	36	13	85	12	53	22	25	6	3	1	105	16
	21.. 169	4	26	5	31	4	77	25	62	15	27	5	2	1	109	17
	28.. 170	3	25	7	34	14	65	11	76	17	26	4	4	1	109	17
April.....	4.. 173	3	23	7	44	9	65	17	62	20	26	6	4	0	92	10
	11.. 172	4	23	9	40	13	69	16	64	15	28	6	4	1	89	13
	18.. 170	6	24	3	36	8	66	12	62	9	27	7	6	2	84	14
	25.. 173	2	25	10	32	7	56	8	67	21	22	5	4	0	81	16
May.....	2.. 177	5	30	3	34	8	67	13	71	24	24	3	3	2	80	17
	9.. 181	8	32	12	34	8	76	22	72	22	23	3	4	1	66	11
	16.. 177	2	30	8	38	14	78	19	72	24	24	8	2	4	70	18
	23.. 184	5	20	7	33	9	64	21	75	21	19	5	1	0	76	11
	30.. 187	7	27	8	31	6	59	11	74	20	25	4	1	1	92	19
June.....	6.. 192	7	39	9	36	12	61	14	62	21	24	7	1	0	79	14
	13.. 193	9	38	17	31	5	47	10	63	17	21	5	1	1	73	13
	20.. 194	11	27	8	31	8	58	16	62	23	23	4	2	0	62	13
	27.. 198	1	33	9	35	11	61	16	53	8	25	5	1	1	45	7
July.....	4.. 200	3	29	4	26	4	55	11	42	5	23	3	2	1	44	6
	11.. 201	8	21	7	25	12	47	9	48	12	22	3	3	1	49	11
	18.. 200	4	19	5	33	7	45	8	41	12	20	4	3	3	39	10
	25.. 204	3	23	3	43	17	47	9	43	10	23	3	1	2	36	8
August.....	1.. 205	5	21	3	51	19	40	8	33	9	25	7	0	2	36	3
	8.. 211	8	23	6	56	15	47	12	26	6	22	4	2	2	38	14
	15.. 212	3	23	8	48	13	50	15	29	7	16	2	2	2	37	8
	22.. 215	6	22	3	08	15	53	14	24	13	19	4	0	0	37	7
	29.. 216	5	29	8	72	31	52	14	20	4	27	6	1	0	30	5
September.....	5.. 214	5	30	10	85	28	38	10	16	3	19	5	0	1	34	10
	12.. 216	4	31	8	88	24	45	6	10	4	23	5	4	1	27	4
	19.. 219	6	29	5	81	16	53	13	10	3	15	2	1	3	31	10
	26.. 226	7	32	11	91	23	49	8	11	4	17	2	3	1	34	9
October.....	3.. 227	11	38	12	93	18	58	14	8	2	13	2	6	1	34	1
	10.. 223	8	34	5	99	20	58	12	9	0	11	3	4	2	28	7
	17.. 228	8	38	10	94	19	60	13	13	3	10	0	3	2	22	8
	24.. 209	19	48	10	94	29	67	12	14	3	11	6	3	3	21	5
	31.. 195	11	54	10	116	24	71	13	9	3	10	1	4	1	20	4
November.....	7.. 186	9	45	11	115	31	61	16	15	2	8	2	2	3	26	9
	14.. 183	7	44	6	86	12	59	12	14	8	11	6	1	1	27	2
	21.. 184	12	44	10	80	18	59	15	14	2	8	0	1	1	24	9
	28.. 182	8	39	13	67	13	59	19	23	5	9	1	1	0	37	9
December.....	5.. 187	4	44	11	66	11	74	24	23	4	9	2	2	1	36	12
	12.. 184	10	55	18	62	10	87	19	26	8	8	0	0	1	43	14
	19.. 183	7	46	11	59	6	81	16	26	6	10	2	3	0	51	8
	26.. 184	4	37	5	56	4	80	19	29	4	8	1	3	1	58	15
1904, January.....	2.. 186	10	52	8	57	17	96	24	35	13	10	0	5	1	65	16
Average number of places for week.....	191	7	33	9	56	13	67	15	41	11	20	4	3	1	67	13

\* The numbers of "All places" are copied from the weekly bulletins, "Health in Michigan," issued every Wednesday, and include all places at which the several diseases were reported present up to and including Saturday of the calendar week for which each bulletin is issued. The "New places" are included in these numbers.

† The remainder of foot-notes are on page 104.



The information contained in the reports upon the above-mentioned blanks and those supplied to health officers of townships, cities and villages, for their annual reports, when returned to this office by the health officers of localities where dangerous communicable diseases have existed, together with other correspondence in regard to outbreaks of such diseases, are the bases on which the various statements made in this article are founded.

It is probable that in previous years, up to the year 1900, every case of smallpox was reported to the Secretary of the State Board of Health; but that cannot yet be said of any other of the diseases in Table 1, and during the present epidemic of a mild form of smallpox, probably it cannot be truthfully said of smallpox. Named in the order of most complete reports, probably these communicable diseases would be arranged as follows: Smallpox, scarlet fever, diphtheria, typhoid fever, measles, whooping-cough, meningitis, consumption.

*Some of the purposes of this compilation.*—The object in having the data contained in the various reports received at the office of the secretary compiled, tabulated and published are: First, that facts relative to the ways whereby dangerous communicable diseases are spread in Michigan, and how they are sometimes restricted, and other useful facts, may be submitted to the people of the State, knowledge of which, it is hoped, will enable them to avoid or combat such diseases; and second, by the collation of such data to aid in the progress of sanitary science, especially in so far as it bears on the study of the causes and best measures for the prevention of dangerous communicable diseases in Michigan.

Persistent efforts of this Board have been directed toward impressing the people of the State with the necessity of adopting restrictive measures,—isolation and disinfection, in outbreaks of communicable diseases.

*Definition of the term "outbreak" as used in this article.*—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over sixty days has elapsed since the last case (in a given jurisdiction), died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area.

#### ABSTRACTS FROM THE QUARTERLY REPORTS OF WORK IN THE OFFICE OF THE SECRETARY, DURING THE YEAR 1903.

*Summary relative to the year 1903.*—The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken

The numbers in the first column, "Places," are compiled from the data in card-reports for the sickness statistics, the outbreak reports of communicable diseases, and the weekly reports of communicable diseases.

† The "New places," are those from which the specified diseases were first reported during the calendar week specified in each bulletin. They are compiled from the same sources as are the numbers in the first column of this table and from newspaper reports. Neither of the columns of this table contains all the places at which, later, by the "final" and "annual" reports, the diseases were found to have been present; but the compilation of a table which should contain all such places would be impracticable; and this table is sufficiently complete to give a good practical knowledge of the subject.



by this office, during the year 1903, are as follows: For consumption, 1,482; for diphtheria (including croup), 562; for typhoid and typho-malarial fever, 897; for scarlet fever, 831; for measles, 629; for whooping-cough, 350; for meningitis, 437; and for smallpox, 689. Total for the eight diseases, 5,877.

The number of communications relative to dangerous communicable diseases, received and placed on file during the year, was 25,502.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly and final reports on cards or in the form of the circular letter, were sent out during the year, to the number of 22,978.

TABLE 2.—YEAR 1903.—*Exhibiting the number of outbreaks of consumption, diphtheria, typhoid fever, scarlet fever, measles, whooping-cough, meningitis and smallpox, from January 1 to December 31, 1903, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, first information concerning which was received through the newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of reports which were denied by the health officer; and the per cent relative to which no reply was received from the health officer.*

Diseases.	Reports from all sources, January 1 to December 31, 1903.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Consumption.....	*1,482	4	61	24	15
Diphtheria (includes croup).....	*562	2	36	18	46
Typhoid fever (includes typho-malarial).....	*897	12	44	30	26
Scarlet fever.....	*831	2	60	20	20
Measles.....	*629	7	47	27	26
Whooping-cough.....	*350	6	64	13	23
Meningitis.....	*437	2	63	12	25
Smallpox.....	*689	2	55	27	18
Averages for the eight diseases.....		5	51	25	24

\* The numbers of outbreaks given in this table do not necessarily agree with the numbers given in tables in special articles in this annual report, for the reason that all alleged outbreaks, of which information was obtained from the newspapers and other sources are included in this table. If the health officers denied that such outbreaks occurred, or if they make no response to the letters sent from this office, relative to newspaper reports, such alleged outbreaks are not included in the final compilation of that disease.

The final reports of outbreaks received and filed during the calendar year 1903, were: For consumption 1,851; for diphtheria 540; for typhoid and typho-malarial fever 732; for scarlet fever 852; for measles 502; for whooping-cough 214; for meningitis 445; and for smallpox 630. Total for the eight diseases 5,766.

The registration and return of deaths in Michigan, to the State Department, has resulted in giving this office, during the year 1903, the first information of the occurrence of 1,132 deaths from consumption; 110 deaths from diphtheria and croup; 199 deaths from typhoid and typho-malarial fever; 26 deaths from scarlet fever; 41 deaths from measles; 159 deaths from whooping-cough, and 378 deaths from meningitis, and 3 deaths from smallpox. A total for the eight diseases of 2,048.

During the year 1903, the local columns of 13,349 newspapers have been looked over for the reports of the occurrence of communicable diseases. (This work is done by the clerk who acts as messenger and janitor, in the intervals of his performance of other duties.) This has resulted in giving this office first information of the alleged occurrence of 54 cases of consumption; 11 outbreaks of diphtheria; 104 outbreaks of typhoid and typho-malarial fever; 20 outbreaks of scarlet fever; 45 outbreaks of measles; 22 outbreaks of whooping-cough; 8 cases of meningitis and 11 outbreaks of smallpox. A total for the eight diseases of 275. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table (2) on the preceding page.

During the year 1903, compared with the year 1902, action was taken on outbreaks of dangerous communicable diseases as follows: On consumption 99 cases more; on diphtheria 50 outbreaks more; on typhoid and typho-malarial fever 25 outbreaks more; on scarlet fever 206 outbreaks less; on measles 13 outbreaks more; on whooping-cough 21 outbreaks more; on meningitis 6 cases less, and on smallpox 45 outbreaks less, than in 1902. Including all diseases, action was taken upon 49 instances less in 1903 than in 1902.

#### PNEUMONIA IN MICHIGAN IN 1903.

For the year 1903, reports relative to 156 cases, including 75 deaths, from pneumonia were received at this office from 67 localities in Michigan. These cases and deaths constituted only a very small proportion of the whole amount of sickness and of deaths from this disease in the State during 1903. The Vital Statistics Bulletins, published by the Secretary of State, indicate that in the year 1903 pneumonia caused more deaths in Michigan than any other disease; the number of deaths reported from pneumonia having been 2,843. This number includes deaths from lobar or croupous pneumonia, catarrhal, lobular or broncho-pneumonia, and typhoid pneumonia. (The office of the State Board of Health had reports of 36 deaths from typhoid-pneumonia.) Reference to Table 1 of the article on "Sickness Statistics" in this report, shows that of the 5,647 weekly card reports received at this office during the year, seventeen per cent stated the presence of pneumonia under the observation of the reporter. By the same table it may be seen that twenty per cent stated the presence of consumption, under the observation of the physicians reporting; the statements relative to the two diseases



indicating that pneumonia caused fifteen per cent less *sickness* than did consumption. This, however, does not prove that there were a less number of cases of pneumonia because of the much longer duration of cases of consumption.

In the years preceding 1901, when the State Department Bulletins have shown more deaths from pneumonia than from consumption, the *final* compilation has shown a less number from pneumonia, some deaths at first attributed to pneumonia having been found later to have been chargeable to some other disease, the pneumonia having been only the immediate cause, another having been the main cause. But it seems probable that for the year 1903, as for the years 1901 and 1902, this change will not be enough to take pneumonia from the first place in the list of causes of deaths.

The fact that pneumonia is the most dangerous communicable disease in Michigan is the reason why this article on the reports, or lack of reports, of its presence in localities in Michigan is here published. It is to be hoped that the time may come soon when the householders and physicians throughout Michigan will very much more generally act for the interests of the public health than, by this report, they are shown to have done in 1903. When that time comes, it will be interesting and useful to compare the results, as shown in the mortality statistics, with the results of the inaction in the year 1903.

#### CONSUMPTION IN MICHIGAN—YEAR ENDING DECEMBER 31, 1903.

During the year ending December 31, 1903, there were reported to the Secretary of the State Board of Health 2,745 cases, including 2,319 deaths from consumption in Michigan.\* These reports were received from 899 localities in the State. These numbers are probably less than the actual number of consumption-infected localities in Michigan, and very much less than the actual number of cases. Many cases are of long duration, and in the early stages, and sometimes in the latest stages, are not under the care of a physician; as a consequence many of these cases are not reported. From many localities the deaths only from consumption are reported; therefore the apparent ratio of deaths to cases is much too high.

#### CONSUMPTION IN 1903, COMPARED WITH PREVIOUS YEARS.

*According to the reports made to the Secretary of the State Board of Health.*—The compilation of information relative to the prevalence of consumption in Michigan, as thus reported, was made for the first time for the year 1893. Table 1 shows the reported number of cases and deaths from consumption, the number of localities where the disease was reported present, the average numbers of cases and deaths per locality, and the deaths per 100 cases, for each of the years 1893-1903.

\* On a subsequent page, the number of deaths from consumption reported to the Secretary of State is stated to be 2,105. That number includes only deaths from consumption of the lungs, while the number reported to this office (2,745) is not quite so restricted.



TABLE 1.—CONSUMPTION IN MICHIGAN.—Numbers of reported cases and deaths, number of localities in which they occurred, average number of cases and deaths per locality, and the per cent of cases reported which proved fatal, for each of the 11 years, 1893-1903.

Year.	Reported localities.	Reported cases.	Average cases per locality.	Reported deaths.	Average deaths per locality.	Deaths per 100 cases reported.*
1893.....	525	1,988	3.8	1,509	2.9	75.9
1894.....	590	2,060	3.5	1,581	2.7	76.7
1895.....	626	2,068	3.3	1,613	2.6	78.0
1896.....	512	2,198	4.3	1,454	2.8	66.2
1897.....	664	1,715	2.6	1,396	2.1	81.4
1898†.....	922	3,041	3.3	2,727	3.0	89.7
1899.....	920	2,975	3.2	2,516	2.7	84.6
1900.....	837	2,721	3.3	2,221	2.7	81.6
1901.....	891	2,915	3.3	2,344	2.6	80.4
1902.....	873	2,658	3.0	2,185	2.5	82.2
1903.....	899	2,745	3.1	2,319	2.6	84.5

\* From many localities the deaths only from consumption are reported; therefore the apparent ratio of deaths to cases is much too high to correctly represent the fatality of the disease; but as time goes on useful information may be gained by a study of the changes likely to occur in this column.

† Beginning with 1898, the new law for the registration of deaths has resulted in increasing nearly every column in this table; because the deaths reported to the Secretary of State are taken account of under each heading.

The reports to the Secretary of the State Board of Health, while useful for many purposes, are probably now also useful for comparing the deaths in one year with the deaths in another very recent year.

*According to the reports made to the Secretary of State.*—Previous to the year 1898, not all deaths were reported to the Secretary of State, but probably the omissions were about the same in every year until the new law for the registration of deaths took effect, in the latter part of 1897; therefore the statistics of the State Department are useful for comparing one year with another, up to the close of the year 1897, also for comparing the several years since that year. But if the deaths since 1897 are to be compared with those previous to 1898 allowance should be made for the fact that a much greater proportion of the deaths which occurred have been reported under the new law than under the old law.

The following table (2) stating the number of deaths from consumption per 100,000 persons living, reported to the Secretary of State, for each of the thirty-five years, 1869-1903, probably quite accurately represents the annual fluctuations of, but not the total deaths from consumption in Michigan during the the twenty-nine years, 1869-97. But for the six years 1898-1903 inclusive, the deaths were reported under a new law whereby it is believed that nearly all deaths were reported, whereas previous to that year some of the deaths were not reported.

TABLE 2—*Exhibiting the number of reported deaths from pulmonary consumption per 100,000 persons living in Michigan in each of the 35 years, 1869-1903. Compiled from the Secretary of States' Vital Statistics of Michigan. Population for intercensal years estimated by average annual increase based on National and State censuses.*

Year.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
Deaths.....	108.1	122.5	106.0	115.1	109.6	102.0	104.9	109.2	110.9	106.1	105.6	111.7
Year.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.
Deaths.....	116.1	104.4	112.3	120.8	105.3	107.3	108.7	121.0	104.3	105.4	96.3	95.2
Year.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	
Deaths.....	97.7	98.4	105.1	90.4	80.6	91.5	86.5	83.4	85.1	82.4	84.8	

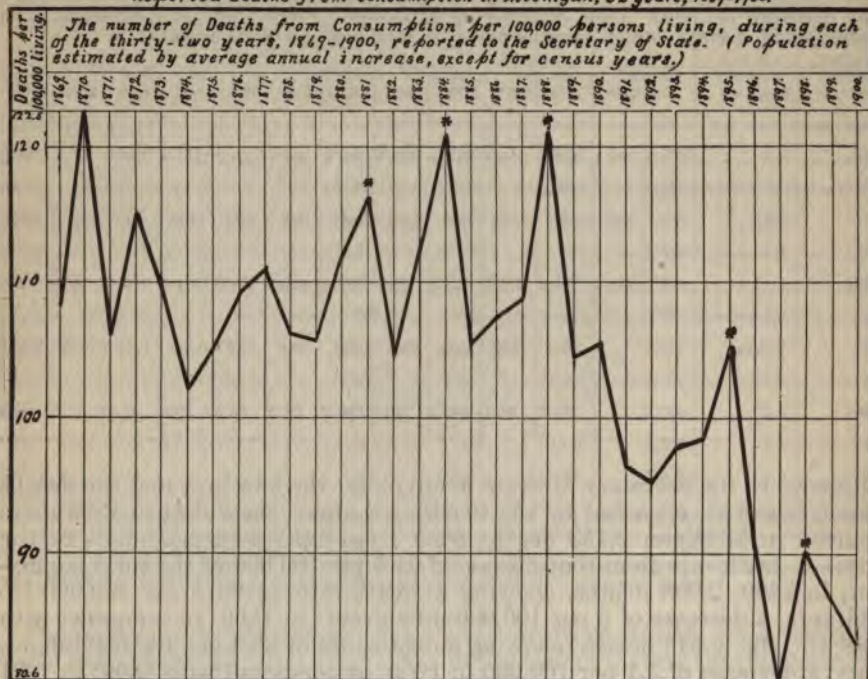
Reports to the Secretary of State made under the new law, and the deaths therein reported, classified by the Bertillon system, show that in 1898 there occurred in Michigan 2,153 deaths from consumption—tuberculosis of the lungs—a death-rate from that disease of 91.5 per 100,000 of the total population; in 1899, 2,098 deaths, showing a death-rate of 86.5 per 100,000 inhabitants, a decrease of 5 per 100,000 inhabitants in 1899, as compared with 1898; in 1900, 2,018 deaths, showing a death-rate of 83.4 per 100,000 inhabitants, a decrease of 3.1 per 100,000 in 1900, as compared with 1899; in 1901 2,088 deaths, showing a death-rate of 85.1 per 100,000 inhabitants, an increase of 1.7 per 100,000 in 1901, as compared with 1900; in 1902 2,030 deaths, showing a death rate of 82.4 per 100,000 inhabitants, a decrease of 2.7 per 100,000 in 1902, as compared with 1901; and in 1903, 2,105 deaths, showing a death-rate of 84.8 per 100,000 inhabitants, an increase of 2.4 per 100,000 in 1903 as compared with 1902.

By Table 2, and more readily by the diagram [Plate 1105], it may be seen that there was a remarkable and unprecedented decrease in the death-rate from consumption in Michigan in 1891, compared with any previous year; it was the first time that the disease had ever decreased so much, and the decrease occurred at a time when influenza was epidemic in this country, and the statistics for the Eastern States show an increase in the death-rate from consumption, which increase was attributed to the influence of the epidemic influenza.

The accompanying diagram [Plate 1105] graphically represents the figures contained in Table 2, to the year 1901.



Reported Deaths from Consumption in Michigan, 32 years, 1869-1900.



\* In 1881, 1884 and 1888, the atmospheric temperature was very low in January, and in February it was slightly lower than the average February during the periods of years, 1864-80, 1864-73, and 1864-77, respectively. In 1895, it was low in January, and very low in February. In 1898, there was no such low temperature in the cold season of the year to which to attribute the apparently unusual mortality from consumption; probably the increase, compared with what might have been expected from the two preceding years, was due to the new law under which a much greater proportion of deaths which occurred were reported than had been in previous years.

[PLATE 1105]

[27] Relative to the last three years represented in the diagram, nearly all deaths which occurred were reported, while previous to that time the deaths reported should be increased by a very considerable per cent to make them equal the deaths which actually occurred; therefore the reduction in the death-rate from consumption in Michigan has undoubtedly been even greater than is apparent from a first glance at the diagram, Plate 1105.

The decrease in consumption in Michigan has apparently resulted from the education of the people generally to a knowledge that consumption is a dangerous communicable disease, which may easily be restricted. It is one more forcible illustration of the fact that "Knowledge is Power." Knowledge of the modes whereby consumption is usually spread, and of the ease with which its spread may be lessened, by the destruction or disinfection of all consumptive sputa, has apparently supplied a "power" which has caused an unprecedented reduction in the death-rate from consumption. The extent of the "campaign of education" which, in Michigan, began in 1880, and which took on an especially vigorous activity in 1891, can hardly be realized without a study of its history; but the apparent results of that educational movement are exceedingly plain to be seen from the diagram—Plate No. 1105.

## DISTRIBUTION OF CONSUMPTION IN MICHIGAN IN 1903.

BY COUNTIES. THE REPORTED CASES AND DEATHS PER 100,000 INHABITANTS. INCLUDES ALL SUCH DEATHS REPORTED TO THE STATE DEPARTMENT.



L.-Locative: C-Cases per 100,000 population, D-Deaths per 100,000 population.

[PLATE 1226]

Some of the reasons for believing that the decrease in the death-rate from consumption has been due to the popular education in the way the disease is usually spread, and in the way to restrict the disease, are: 1. The disease was under observation for many years before that knowledge became general, and (as shown by diagram, Plate 1105) it did not decrease; the decrease has been nearly coincident with the education, lagging behind somewhat at the outset, and gradually increasing later, as it would be expected to do if caused by the popular education. 2. Precisely similar decrease occurred in Michigan in the death-rate from scarlet fever and from other diseases, coincident with systematic popular education in the ways those diseases are usually



spread, and in the best measures for their restriction. 3. The decrease in the mortality from consumption has, apparently, been greatest in those States where systematic popular education for its restriction has been most general and active. 4. There is no other known cause capable of producing such a gradually increasing effect as is shown to have occurred.

*Sickness-rates from reported consumption in 1903.*—Table 3 shows the reported sickness and sickness-rates from consumption by counties in the State. For reasons explained in the first paragraph of this article little reliance can be placed on the completeness of the reports of cases on which these particular sickness-rates are based. They are worked out in the hope that in the near future they may be made more valuable. For comparison of sickness from consumption by months, and for the year 1903 with preceding years, reference should be made to the article on "Time of greatest prevalence of each disease," on preceding pages of this volume.

*Death-rates from reported consumption in 1903.*—Table 3 shows that the death-rate from consumption reported for the whole State in 1903 was 92.4 deaths per 100,000 persons living in the State. This differs very much from the rate shown by the State Department. The explanation of this difference is that, whereas the statement by the Department of State includes only deaths from consumption of lungs (2,105), Table 3 includes all deaths from *consumption* reported to this office (2,745) irrespective of the part of the body in which the disease was located.

The county having the highest death-rate (81.9 deaths per 100,000 of population) was Luce. That having the lowest death-rate (18.5) was Iron.

TABLE 3.—Numbers of cases and deaths reported from consumption and the numbers of reported cases and deaths per 100,000 persons living in each county in Michigan during the year 1903. Compiled from reports of health officers, etc.

State and Counties.	Estimated population for 1903.*	Number of reported		Number per 100,000 population, of		Counties.	Estimated population for 1903.*	Number of reported		Number per 100,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,510,652	2,745	2,319	109.4	92.4	Keweenaw.....	3,421	2	2	58.5	58.5
						Lake.....	4,487	3	3	66.9	66.9
Alcona.....	5,826	7	7	120.2	120.2	Lapeer.....	27,024	18	15	66.6	55.5
Alger.....	8,103	9	8	111.1	98.7	Leelanau.....	11,045	15	11	135.8	99.5
Allegan.....	38,624	38	30	98.4	77.7	Lenawee.....	48,338	51	43	105.5	89.0
Alpena.....	18,521	15	15	81.0	81.0	Livingston.....	19,278	20	17	103.7	88.2
Antrim.....	18,632	11	10	59.0	53.7	Luce.....	3,298	7	6	212.2	181.9
Arenac.....	11,258	8	7	71.1	62.2	Mackinac.....	7,934	12	12	151.2	151.2
Baraga.....	4,365	5	4	114.5	91.6	Macomb.....	33,670	27	18	80.2	53.5
Barry.....	21,921	21	16	95.8	73.0	Manistee.....	28,723	32	24	111.4	83.6
Bay.....	62,912	58	55	92.2	87.4	Marquette.....	42,850	67	45	156.4	105.0
Benzie.....	10,489	16	16	152.5	152.5	Mason.....	19,113	18	16	94.2	83.7
Berrien.....	50,926	51	42	100.1	82.5	Mecosta.....	20,675	21	21	101.6	101.6
Branch.....	28,609	28	24	98.0	83.9	Menominee.....	27,593	35	35	126.8	126.8
Calhoun.....	50,233	53	46	105.5	91.6	Midland.....	15,048	5	5	33.2	33.2
Cass.....	20,726	25	16	120.6	77.2	Missaukee.....	10,478	10	8	95.4	76.4
Charlevoix.....	15,099	22	19	145.7	125.8	Monroe.....	32,542	32	27	98.3	83.0
Cheboygan.....	16,413	17	15	103.6	91.4	Montcalm.....	32,053	23	18	71.8	56.2
Chippewa.....	24,338	20	20	82.2	82.2	Montmorency.....	3,630	3	3	82.6	82.6
Clare.....	8,549	12	10	140.3	116.8	Muskegon.....	36,932	36	31	97.5	83.9
Clinton.....	24,573	21	16	85.5	65.1	Newaygo.....	16,948	11	10	64.9	59.0
Crawford.....	3,057	2	2	65.4	65.4	Oakland.....	45,848	54	40	117.8	87.2
Delta.....	26,185	35	29	133.7	110.8	Oceana.....	17,665	14	14	79.3	79.3
Dickinson.....	19,463	14	11	71.9	56.5	Ogemaw.....	8,827	8	8	90.6	90.6
Eaton.....	31,195	41	31	131.4	99.4	Ontonagon.....	5,859	12	7	204.8	119.5
Emmet.....	18,700	21	15	112.3	80.2	Osceola.....	18,549	25	17	134.8	91.6
Genesee.....	42,428	46	41	108.4	96.6	Oscoda.....	1,300	1	1	76.9	76.9
Gladwin.....	7,392	5	4	67.6	54.1	Otsego.....	6,862	7	7	102.0	102.0
Gogebic.....	18,064	24	24	132.9	132.9	Ottawa.....	39,955	43	35	107.6	87.6
Grand Traverse...	21,958	40	23	182.1	104.7	Presque Isle.....	10,270	3	3	29.3	29.3
Gratiot.....	30,444	38	36	124.8	118.2	Roscommon.....	1,850	3	3	162.2	162.2
Hillsdale.....	29,662	35	25	117.9	84.3	Saginaw.....	80,911	75	71	92.7	87.8
Houghton.....	76,998	122	74	158.4	96.1	Sanilac.....	35,607	31	27	87.1	73.0
Huron.....	35,113	28	26	79.7	74.4	Schoolcraft.....	8,267	10	6	121.0	72.6
Ingham.....	39,881	44	38	110.3	95.3	Shiawassee.....	34,370	38	28	110.6	81.5
Ionia.....	34,084	35	26	102.7	76.3	St. Clair.....	55,678	45	41	80.8	73.6
Iosco.....	9,201	14	13	152.2	141.3	St. Joseph.....	23,290	29	21	124.5	90.2
Iron.....	10,835	4	2	36.9	18.5	Tuscola.....	36,625	28	27	76.5	73.7
Isabella.....	23,453	18	13	76.7	55.4	Van Buren.....	34,375	34	28	98.9	81.5
Jackson.....	49,062	49	45	99.9	91.7	Washtenaw.....	49,885	71	46	142.3	92.2
Kalamazoo.....	45,435	64	41	140.9	90.2	Wayne.....	376,951	443	434	117.5	115.1
Kalkaska.....	7,877	9	7	114.3	88.9	Wexford.....	18,240	19	15	104.1	82.2
Kent.....	133,596	179	168	134.0	125.8						

\* Population estimated by average annual increase (arithmetical method), based on the State Census of 1894 and the U. S. Census of 1900.



*Deaths, by months, from consumption and from pulmonary consumption.*—The first two lines in Table 4 show that in 1903, as compared with the average for the nine years, 1894-1902, there was a large apparent increase in the number of deaths from consumption. This apparent increase may not be real, but due to a larger proportion of the actual deaths being reported since the new registration law became operative, as in addition to the deaths reported directly to this office, others reported to the Secretary of State, of which we have not been notified by health officers, are received at this office from the Bureau of Vital Statistics in the State Department.

The maximum number of deaths from pulmonary consumption for 1894-1902 occurred in April and May, the minimum number in July.

The maximum number of deaths from all forms of consumption as reported to this office for the years 1894-1902 occurred in May and December, the minimum number in July.

TABLE 4.—*Exhibiting by months the number of deaths from consumption in Michigan, for the year 1903, and the averages for the nine years, 1894-1902, as reported to the State Board of Health; also exhibiting by months, the number of deaths from pulmonary consumption for the year 1903, and the averages for the nine years, 1894-1902, as reported to the Secretary of State.*

Year.	Total number	Number of deaths for each month.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.....	2,303	184	191	211	204	211	188	191	179	177	215	175	177
Av. 9 years, 1894-1902.....	1,002	138	131	144	145	152	124	113	119	117	133	135	150
1903*.....	2,105	170	182	197	197	199	178	168	157	156	190	158	158
Av. 9 years, 1894-1902.....	2,106	170	163	204	205	205	170	154	170	160	163	165	178

\* The last two lines in Table 4 are the number of deaths from pulmonary consumption by months as reported to the Secretary of State.

*Ages of fatal and non-fatal cases of consumption.*—In Table 5 are shown the numbers of cases and deaths from consumption in Michigan in 1903, in which the ages were stated in the health officers' reports. In this table the cases and deaths are arranged in *age-groups*, showing what per cent the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; the per cent the deaths in each group were of the cases in that group, and the per cent the deaths in principal groups were of all deaths.

Table 6 shows that for the year 1903 and for the nine years, 1894-1902, the greatest per cent of deaths was in persons between twenty and thirty years of age, the next greatest per cent between thirty and forty years of age. Also that the per cent of deaths in each age-period is about the same in 1903 as in the nine years preceding.

*Average age of decedents from consumption.*—The average age of decedents from consumption in 1903 was 36.7 years for males, and 32.6 years for females. The average age of death of males for nine years, 1894-1902, was 36.8 years, and for females 32.5 years.



TABLE 5.—*Exhibiting, by sex, in certain age-groups, the number of cases and the number of deaths from consumption; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; and the per cent that the deaths in each group were of the cases in that group. Compiled from all reports for the year 1903, which stated the ages.*

Ages in groups of years.	Sex.	All known ages *.	Number and per cent of cases and deaths in certain age-groups.														
			Under 10 years	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 to 64.	65 to 69.	70 to 74.	75 years and over.
No. of cases.....	Males.....	1,123	57	14	85	159	149	118	101	86	81	72	60	45	41	31	24
	Females..	1,401	34	41	182	255	214	173	117	94	68	55	37	49	38	21	23
Per cent the cases in each group were of all cases of known ages...	Males.....		5.1	1.2	7.6	14.2	13.3	10.5	9.0	7.7	7.1	6.4	5.3	4.0	3.7	2.8	2.1
	Females.....		2.4	2.2	13.0	18.2	15.3	12.3	8.4	6.7	4.9	3.9	2.6	3.5	2.7	1.5	1.6
No. of deaths.....	Males.....	1,005	52	10	71	145	136	102	88	76	69	69	54	42	40	28	23
	Females..	1,283	34	34	166	235	202	159	106	84	62	52	33	44	33	16	23
Per cent the deaths in each group were of cases in that group.....	Males.....	89.5	91.2	71.4	83.5	91.2	91.3	86.4	87.1	88.4	85.2	95.8	90.0	93.3	97.6	90.3	95.8
	Females..	91.6	100	82.9	91.2	92.2	94.4	91.9	90.6	89.4	91.2	94.5	89.2	89.8	86.8	76.2	100
Per cent the deaths in each group were of all deaths at known ages...	Males.....		5.2	1.0	7.1	14.4	13.5	10.1	8.8	7.6	6.9	6.9	5.4	4.2	4.0	2.8	2.3
	Females.....		2.7	2.7	12.9	18.3	15.7	12.4	8.3	6.5	4.8	4.0	2.6	3.4	2.6	1.2	1.8
Per cent the deaths in special groups were of all deaths at known ages...	Males....		6.2			35.0			26.5					32.3			
	Females ..		5.3			47.0			27.2					20.3			

\* Does not include those cases or deaths where the age was not stated.

*Reported sources of contagium of consumption.\**—Of the 2,745 reported cases of consumption during the year 1903, the local health officers reported the source of contagium in 1,533 instances as follows: Following some previous sickness, as cold, pleurisy, cough, diphtheria, influenza, la grippe, bronchitis, pneumonia, hemorrhage, paralysis, syphilis, eczema, curvature of spine, change of life, throat trouble, menstrual trouble, stomach trouble, typhoid fever, excessive child bearing, run down condition, inflammation of lungs, quinsy, always weakly, catarrh, measles and bronchitis, suppressed goitre and la grippe, Bright's disease, specific disease, measles, lung fever, measles and whooping-cough, leg amputated, appendicitis, diarrhea and bowel trouble, St. Vitus' dance, exposure, bone disease, asthma, 318; hereditary†, 105; traced to a former case, 155; idiopathic, injury, overwork, poor ventilation, milk from cow, infected bank notes, senility, atelectasis, congenital, 68; unknown, 663; and not stated, 224.

\* On a subsequent page of this article is a statement showing, in 1,156 instances, how the disease was reported to have begun.

† There is a reason to believe that most of the reports which stated the disease to be "hereditary" were made because of the belief of the reporters in the transmission of the disease in that manner, but that most such reports are made without sufficient proof to satisfy any scientific investigator.



*Duration of consumption.—Fatal and non-fatal cases.*—By Table 7 it may be seen that from reports received for 1903 and for the years 1894-1902, which stated the interval between the time of being taken sick and the time of death from consumption, the largest per cent of both males and females were sick less than one year. The next highest per cent of decedents were sick from one to two years, and as the duration of sickness grew longer the per cent of deaths decreased. The average duration of fatal cases reported in the nine years, 1894-1902, was, for males 19.6 months and for females 20.2 months.

TABLE 6.—AGE DISTRIBUTION OF DECEDENTS FROM CONSUMPTION: *Exhibiting, by sex, the persons who died of consumption, during the year 1903, and also during the years 1894-1902, the number, the average number, and per cent in each period of age. Compiled from such reports to the State Board of Health, as stated sex and age.*

Year.	1903.						1894-1902.								
	Number.			Per cent.			Number.			Per cent.			Av. number.		
	Males. Females. Both sexes.			Males. Females. Both sexes.			Males. Females. Both sexes.			Males. Females. Both sexes.			Males. Females. Both sexes.		
Age at death, in periods of years.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
Under 10.....	51	34	85	5	3	4	201	248	449	3	3	3	25	31	56
10 to 20.....	81	200	281	8	16	12	477	1,097	1,574	8	15	12	60	137	197
20 to 30.....	281	437	718	28	34	31	1,681	2,436	4,117	29	33	31	210	305	515
30 to 40.....	190	265	455	19	21	20	1,213	1,603	2,816	21	22	21	152	200	352
40 to 50.....	145	146	291	14	11	13	900	846	1,747	15	11	13	113	106	218
50 to 60.....	123	85	208	12	7	9	643	529	1,172	11	7	9	80	66	147
60 to 70.....	82	77	159	8	6	7	463	413	876	8	6	7	58	52	110
Over 70.....	52	39	91	5	3	4	286	235	519	5	3	4	36	29	65
All ages.....	1,005	1 283	2,288	44	56	100	5,864	7,407	13,271	44	56	100	733	926	1,659

By Table 8 it may be seen that, from the reports of non-fatal cases of consumption during the nine years 1894-1902, the highest per cent were sick under one year, the next highest per cent were sick from one to two years, and as the duration grew longer the per cent of cases decreased. The average duration of sickness in non-fatal cases of consumption during the nine years 1894-1902 was, in males 14.5, and in females 18.6 months.

*Sex, average age and average duration of sickness of cases of consumption reported as having recovered.*—In the reports relative to consumption received at this office during the years 1894-1903, one hundred and fifty-three cases were said to have recovered from the disease; eleven of these cases were reported in 1894, six in 1895, seven in 1896, nine in 1897, eight in 1898, eight in 1899, twenty-five in 1900, thirty-four in 1901, twenty in 1902 and twenty-five in 1903; these cases are tabulated on page 118 according to sex, age and duration.

TABLE 7.—*Exhibiting, by sex of patient, the duration in months and years of fatal cases of sickness from consumption, in Michigan, during the year 1903, and the 9 years 1894-1902, arranged in time periods. Compiled from those reports which stated the length of time the patient was sick.*

Fatal cases of consumption.																					
Year.	Sex.	Average duration in months.	No. of cases included.	Duration of sickness:—Per cent of deaths in each period.																	
				All cases.	1 Month.	2 Months.	3 Months.	4 Months.	5 Months.	6 Months.	7 Months.	8 Months.	9 Months.	10 Months.	11 Months.	Under one year.	1 to 2 years.	2 to 3 years.	3 to 4 years.	4 to 5 years.	Five years and over.
1903.	Males. ....	16.2	625	100	8.0	7.0	6.1	5.0	3.7	7.7	3.7	3.8	3.7	3.4	2.2	55.7	17.8	11.5	7.2	2.2	5.6
	Females...	14.0	823	100	7.0	6.3	7.7	5.3	4.6	7.2	4.5	6.0	2.7	2.7	2.2	56.1	22.6	11.4	5.3	1.2	3.0
1894-1902.	Males. ....	19.6	3,659	100	5.3	4.8	5.2	5.4	4.8	7.9	3.7	3.9	3.4	2.8	2.3	49.4	24.0	12.7	5.5	2.3	6.2
	Females...	20.2	4,907	100	3.4	4.5	5.9	5.4	5.1	6.8	4.6	4.5	4.8	2.6	2.8	50.4	24.2	12.0	5.5	2.3	5.6

TABLE 8.—*Exhibiting, by sex of patient, the duration in months and years, of non-fatal cases (still sick) of consumption, in Michigan, in the year 1903, and for the years 1894-1902, as stated in the reports to the State Board of Health.*

Non-fatal cases of consumption.																						
Year reported.	Sex.	Average duration in months.	No. of cases included.	Duration of sickness:—Per cent of cases in each period.																		
				All periods.	1 Month.	2 Months.	3 Months.	4 Months.	5 Months.	6 Months.	7 Months.	8 Months.	9 Months.	10 Months.	11 Months.	Under 1 year.	1 to 2 years.	2 to 3 years.	3 to 4 years.	4 to 5 years.	5 to 9 years.	Ten years and over.
1903.	Males....	18.1	100	100	4.0	4.0	6.0	4.0	6.0	8.0	6.0	2.0	4.0	3.0	1.0	48.0	28.0	9.0	7.0	1.0	7.0	0
	Females.	22.9	99	100	4.0	2.0	6.1	4.0	6.1	8.1	6.1	2.0	4.0	3.0	1.0	36.4	26.3	12.1	12.1	5.0	8.1	0
1894-1902.	Males....	14.5	518	100	5.0	4.8	7.7	4.1	3.9	2.7	3.5	5.8	3.5	5.6	4.4	51.0	25.5	12.5	6.6	2.1	1.7	.6
	Females.	18.6	686	100	4.7	5.2	5.5	3.8	3.4	4.8	2.9	4.7	5.7	4.4	3.6	48.7	26.4	9.6	6.9	3.4	1.6	2.0

The average age of cases recovered for the year 1903, was 36.6 years, for males and 22.5 years for females. For the nine years, 1894-1902, the average age was 30.5 years for males and 29.0 years for females.

The average duration of cases recovered for the year 1903 was 13 months for males and 29.8 months for females. For the nine years, 1894-1902, the average duration was 10.4 months for males and 12.3 months for females.

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TABLE 9.—*Exhibiting, by sex, the ages of cases \* reported as having recovered from consumption, and the duration of sickness, for the years 1894-1903.*

Males.		Females.	
Age in years.	Duration of sickness by months.	Age in years.	Duration of sickness by months.
18.....	7	21.....	44
27.....	4	19.....	5
19.....	7	35.....	3
27.....	8	37.....	2
29.....	12	36.....	9
26.....	4	35.....	3
35.....	24	20.....	2
47.....	3	42.....	8
35.....	1	31.....	13
42.....	12	24.....	6
24.....	16	4.....	14
35.....	23	38.....	36
21.....	10	6.....	2
5.....	1	18.....	7
16.....	12	24.....	8
16.....	3	28.....	24
22.....	1	62.....	17
40.....	18	19.....	8
45.....	4	43.....	12
60.....	8	16.....	3
64.....	9	42.....	8
38.....	1	35.....	3
26.....	5	20.....	8
22.....	3	33.....	2
16.....	6	33.....	4
66.....	3	28.....	2
22.....	26	17.....	3
51.....	22	30.....	9
40.....	11	32.....	6
26.....	24	29.....	10
58.....	6	31.....	12
30.....	28	21.....	9
35.....	20	45.....	9
51.....	11	48.....	66
14.....	Not stated.	39.....	47
41.....	Not stated.	17.....	3
34.....	Not stated.	20.....	Not stated.
26.....	Not stated.	22.....	Not stated.
35.....	Not stated.	16.....	Not stated.
37.....	Not stated.	30.....	Not stated.
Not stated.....	46	17.....	Not stated.
Not stated.....	39	19.....	Not stated.
Not stated.....	4	43.....	Not stated.
Not stated.....	2	51.....	Not stated.
Not stated.....	2	23.....	Not stated.
Not stated.....	4	33.....	Not stated.
Not stated.....	13	32.....	Not stated.
Not stated.....	2	Not stated.....	12
35.....	2	Not stated.....	12
Not stated.....	49	Not stated.....	5
47.....	5	Not stated.....	7
Not stated.....	Not stated.	Not stated.....	12
Not stated.....	5	Not stated.....	5
Not stated.....	19	Not stated.....	13
Not stated.....	Not stated.	Not stated.....	17
Not stated.....	15	25.....	15
37.....	Not stated.	Not stated.....	80
Not stated.....	Not stated.	Not stated.....	15
		Not stated.....	44
		20.....	12
		Not stated.....	7
		27.....	71
		20.....	43
		36.....	32
		Not stated.....	Not stated.
		Not stated.....	Not stated.
		19.....	15
		3.....	24
		Not stated.....	25
		45.....	Not stated.

\* Sex, age and duration not stated in six cases reported as having recovered.



*Location of the disease, reported for the year 1903, in 2,073 instances.*

Lungs.....	1,697	Lungs and alimentary tract.....	1	Thoracic cavity.....	2
Lungs and bowels.....	33	Lungs, bowels and bronchi.....	1	Renal.....	2
Lungs and throat.....	29	Lungs and kidney.....	1	Abdomen.....	2
Lungs and larynx.....	15	Lungs and omentum.....	1	Abdomen and kidney.....	1
Lungs and general.....	10	Lungs and ankle.....	1	Bowels and joints.....	1
Lungs and intestines.....	8	Lungs and pleura.....	1	Bladder.....	1
Lungs and stomach.....	5	Lungs, bowels, peritoneum and mesentery.....	1	Chest.....	1
Lungs and bronchi.....	4	Lungs, stomach and bowels.....	1	Chest and abdomen.....	1
Lungs and miliary.....	3	General.....	64	Chest and peritoneum.....	1
Lungs and mesenteric glands.....	3	Bowels.....	41	Ribs.....	1
Lungs and abdomen.....	3	Peritoneum.....	20	Cerebral.....	1
Lungs and liver.....	2	Larynx.....	15	Head and abdomen.....	1
Lungs and throat.....	2	Bronchi.....	9	Brain and bowels.....	1
Lungs and spine.....	2	Throat.....	9	Brain and miliary.....	1
Lungs, throat and bronchi.....	1	Intestines.....	8	Leg.....	1
Lungs and tissues.....	1	Fibroid.....	6	Hip and bowels.....	1
Lungs and peritoneum.....	1	Stomach.....	6	Neck and glands.....	1
Lungs, head, throat and membranes.....	1	Lymphatic glands.....	6	Throat and neck.....	1
Lungs and heart.....	1	Hip joint.....	5	Pharynx.....	1
Lungs and hips.....	1	Spine.....	4	Pharynx and larynx.....	1
Lungs, kidney and brain.....	1	Enteritis.....	4	Skin.....	1
Lungs and pharynx.....	1	Mesentery.....	4	Blood.....	1
Lungs and rectum.....	1	Acute.....	2	Abscess.....	1
Lungs, brain and spine.....	1	Brain.....	2	Unknown.....	8

*Summary of the information contained in final reports of cases of consumption during the year 1903.*—Of the 2,644 consumptives of whom the sex was stated, 1,166 were males and 1,478 were females.

Of 2,385 consumptives of whom the color was stated, 2,297 were white, 50 black (negroes) and 38 red (Indians).

The complexion of 1,293 consumptives was stated as: Black 16, dark 431, light 846.

The color of hair was stated in 1,352 instances as: Black 62, dark 583, brown 133, auburn 126, light 420, white or gray 28.

Of the civil condition of 1,881 consumptives, 1,080 were reported as married and 801 single.

In answer to the question, "Were persons infected from this patient?" in 337 instances the reply was "yes."

*Disposal of sputa of patients.*—Reports of the local health officers for the year 1903, show that in 679 cases the sputa were burned; in 90 cases the sputa were disinfected and burned; in 32 cases the sputa were disinfected and buried; in 258 cases the sputa were disinfected before being allowed to dry,—sulphur, carbolic solution, formaldehyde, ashes, lime, chloride, corrosive sublimate, zinc solution and mercury were mostly used. In 258 cases the health officer reported positively that the sputa were not disinfected or

burned, and in 91 cases the health officer reported that it was unknown what was done. In the remaining cases nothing was reported about the disposal of sputa.

*Results of bacteriological examinations of sputa of alleged consumptives in Michigan, in 1903.*—The sputa of consumptives was reported examined in 329 cases. Of these 256 (or about 78 per cent) gave positive results, that is the bacilli tuberculosis were found, 17 cases (or about 5 per cent) gave negative results, and in 56 cases the result was not stated, or was unknown.

*Disinfection of rooms occupied by consumptives.*—In answer to the question relative to the manner of disinfection of rooms occupied by consumptives, 1,599 replies were given for the year 1903, as follows:

In 295 instances sulphur was used, in the proportion of three pounds, or more, for each thousand cubic feet of air space; in 152 instances sulphur was used, but the amount was insufficient, or not stated; in 709 instances formaldehyde was used, in the proportion of eight ounces, or more, for each thousand cubic feet of air space; in 388 instances formaldehyde was used, but the amount was insufficient, or not stated; in 45 instances both sulphur and formaldehyde were used, in varying amounts; in four instances chloride of lime was used; in five instances carbolic acid was used, and in one instance creolin was used.

Of the 2,319 deaths from consumption which occurred in Michigan during the year 1903, in only 1,004 instances were the rooms occupied by the patients definitely reported to have been thoroughly disinfected.

*Consumptive relatives, reported in 1903, in 1 448 instances.*

Father.....	36	Mother, cousin and nephew.....	1	Aunt and cousin.....	2
Father and sister.....	7	Brother.....	55	Wife.....	12
Father and cousin.....	1	Brother and sister.....	20	Wife and children.....	2
Father and husband.....	1	Brother, aunt and uncle.....	1	Husband.....	8
Father and grandmother.....	1	Brother, sister and niece.....	1	Husband and sister.....	1
Father, uncle and aunt.....	1	Brother and cousin.....	1	Mother-in-law.....	1
Father and mother.....	2	Brother and children.....	1	Brother-in-law.....	2
Father, mother and brother.....	1	Sister.....	77	Sister-in-law.....	6
Father, brother and sister.....	2	Sister and niece.....	1	Niece.....	2
Father, mother and sister.....	3	Sister and daughter.....	1	Nephew.....	5
Father and brother.....	8	Son.....	9	Cousin.....	9
Father, brother and children.....	1	Son and daughter.....	4	Grandfather.....	2
Father, husband and children.....	1	Son and sister.....	1	Grandfather and uncle.....	1
Mother.....	75	Daughter.....	20	Grandparents.....	2
Mother and brother.....	7	Uncle.....	11	Grandmother.....	12
Mother and sister.....	15	Uncle and aunt.....	4	Grandmother and sister.....	1
Mother and uncle.....	3	Uncle, aunt and cousin.....	1	Grandmother, brother and aunt..	1
Mother and aunt.....	1	Uncle, aunt and grandparents....	1	No.....	824
Mother, brother and sister.....	5	Great uncle.....	1	Yes.....	19
Mother, cousin and aunt.....	1	Aunt.....	16	Unknown.....	134
Mother, brother and daughter....	2	Aunt and wife.....	1		

# CONSUMPTION IN MICHIGAN IN 1903.

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*Occupation of consumptives reported in 1903 in 1,782 instances.*

Housewife.....	617	Photographer.....	4	Brakeman.....	1
Farmer.....	217	Peddler.....	4	Brassfinisher.....	1
Laborer.....	202	Woodman.....	4	Cashier.....	1
Servant.....	128	Basketmaker.....	3	Collector.....	1
Student.....	62	Butcher.....	3	Commissioner.....	1
Clerk.....	40	Conductor.....	3	Cooper.....	1
Machinist.....	33	Jeweler.....	3	Dentist.....	1
Pupil.....	33	Mail carrier.....	3	Electrician.....	1
Carpenter.....	25	Mason.....	3	Feather renovator.....	1
Dressmaker.....	22	Musician.....	3	Forelady.....	1
Gardener.....	22	Printer.....	3	Foreman.....	1
Painter.....	15	Shoemaker.....	3	Furnisher.....	1
Factory hand.....	14	Tailor.....	3	Janitor.....	1
Bookkeeper.....	12	Teamster.....	3	Messenger.....	1
Agent.....	11	Polisher.....	3	Motorman.....	1
Landlord.....	11	Brewer.....	2	Packer.....	1
Miner.....	11	Cabinetmaker.....	2	Postmaster.....	1
Cook.....	10	Grocer.....	2	Porter.....	1
Merchant.....	10	Manufacturer.....	2	Plasterer.....	1
Barber.....	9	Milkman.....	2	Sawyer.....	1
Blacksmith.....	9	Organist.....	2	Singer.....	1
Engineer.....	9	Paperhanger.....	2	Springmaker.....	1
Minister.....	8	Plumber.....	2	Stonecutter.....	1
Saloonkeeper.....	8	Sailor.....	2	Telephone operator.....	1
Barkeeper.....	6	Showman.....	2	Upholsterer.....	1
Drayman.....	6	Stenographer.....	2	Undertaker.....	1
Druggist.....	6	Soldier.....	2	Woodcarver.....	1
Furniture dealer.....	5	Tinsmith.....	2	Infant.....	42
Moulder.....	5	Telegrapher.....	2	Child.....	12
Baker.....	4	Traveling man.....	2	County charge.....	9
Laundress.....	4	Woodcutter.....	2	Prisoner.....	2
Nun.....	4	Artist.....	1	Insane patient.....	26
Nurse.....	4	Boilermaker.....	1		



*Nationality of consumptives reported in 1903, in 1,775 instances.*

American.....	997	Negro.....	22	French and German.....	1
German.....	204	Polish.....	21	Russian.....	1
Canadian.....	81	Scotch.....	19	Swiss.....	1
Irish.....	79	Norwegian.....	12	Welch.....	1
Dutch.....	69	Austrian.....	8	Roumanian.....	1
English.....	49	Dane.....	5	Bohemian.....	1
Swede.....	48	Italian.....	5	English and Irish.....	1
French.....	44	Scandinavian.....	3	Jewish.....	1
Indian.....	42	Belgian.....	2	Mexican.....	1
Finlander.....	35	French and Indian.....	1	Unknown.....	20

*The methods and materials used in the disinfection of soiled articles in 1903 was mentioned in 1,392 instances as follows:*

Disinfected and burned.....	217	Boiled.....	47	Sulphur and zinc.....	1
Disinfected and boiled or washed.	123	Washed.....	24	Carbolic solution.....	10
Disinfected.....	82	Washed and buried.....	1	Carbolic solution and corrosive sublimate.....	5
Disinfected, burned and boiled...	43	Buried.....	4	Carbolic solution and lime.....	2
Disinfected and buried.....	9	Destroyed..	7	Bichloride of soda.....	9
Burned.....	185	Formaldehyde.....	157	Zinc.....	2
Burned and washed.....	96	Formaldehyde and sulphur.....	12	Kreo.....	1
Burned and buried.....	5	Formaldehyde and bichloride.....	2	Mercury.....	1
Burned, boiled and buried.....	2	Formalin.....	1	Not disinfected.....	141
Fumigated and burned.....	17	Formalin and carbolic solution...	1	Unknown.....	47
Fumigated.....	16	Sulphur.....	109		
Fumigated and washed.....	7	Sulphur and lime.....	3		
Fumigated, burned and boiled....	2	Sulphur and bichloride.....	1		

*For the year 1903, the disease was stated to have begun\* in 1,156 instances with—*

Cold.....	495	Cough and la grippe.....	1	Kidney and bladder trouble.....	1
Cold and cough.....	18	Hemorrhage.....	50	Curvature of spine.....	1
Cold and hemorrhage.....	14	Typhoid fever.....	11	Tonsillitis.....	1
Cold and bronchitis.....	11	Typhoid pneumonia.....	4	Insomnia.....	1
Cold and la grippe.....	8	Diarrhea.....	9	Tumor.....	1
Cold and influenza.....	5	Pleurisy.....	8	Cirrhosis of liver.....	1
Cold and diarrhea.....	2	Catarrh.....	7	Senile consumption.....	1
Cold and abscess.....	1	Catarrh and bronchitis.....	2	Gastric trouble.....	1
Cold, fever and throat trouble....	1	Throat trouble.....	6	Womb trouble.....	1
Cold and sore throat.....	1	Abscess.....	6	Sore mouth and throat trouble..	1
Cold, influenza and pneumonia...	1	Fever.....	5	Hay fever.....	1
Cold and pleurisy.....	1	Measles.....	5	Dust on lungs.....	1
Cold, pneumonia and hemorrhage	1	Confinement.....	5	Chills and cough.....	1
Bronchitis.....	117	Asthma.....	4	Inflammation of lungs.....	1
Bronchitis and pneumonia.....	3	Enlarged glands.....	4	Hemorrhage and pneumonia.....	1
Bronchitis and hemorrhage.....	1	Rheumatism.....	5	Stomach trouble.....	1
Bronchitis and measles.....	1	Miscarriage.....	2	Paralysis.....	1
Influenza or la grippe.....	111	Whooping-cough.....	3	Chills and fever.....	1
Influenza and pleurisy.....	1	Swelling of limbs.....	3	Injury to lung.....	1
Influenza and bronchitis.....	1	Anemia.....	2	Pleurisy and bronchitis.....	1
La grippe and hemorrhage.....	5	Laryngitis.....	2	Result of vaccination.....	1
La grippe and pneumonia.....	1	Tuberculosis of bones.....	2	Overwork.....	1
La grippe and whooping-cough...	1	Hip joint disease.....	2	Asthma and bronchitis.....	1
Pneumonia.....	86	Profuse expectoration.....	2	Unknown.....	9
Gradual decline.....	48	Headache.....	2		
Cough.....	35	Kidney trouble.....	2		

\*The reported sources of contagium of consumption, in 1,533 instances, may be found in the text immediately following Table 6 of this article.

*Bowel discharges were disposed of in 1,329 instances, as follows:*

Vault or closet..	287	Burned and sulphur.....	1	Platt's chloride.....	1
Sewer.....	110	Burned and carbolic.....	1	Formaldehyde and lime.....	1
Buried.....	259	Carbolic.....	47	Calcium chloride.....	1
Disinfected and buried.....	114	Lime.....	32	Kreso.....	1
Disinfected and vault.....	68	Bichloride.....	14	Whitewash.....	1
Disinfected and sewer.....	19	Copperas.....	7	Carbolic and ashes.....	1
Disinfected.....	76	Formaldehyde.....	7	Carbolic and Platt's chloride....	1
Burned.....	50	Destroyed.....	7	Antiseptic solution.....	1
Burned and buried.....	3	Ashes.....	3	Steam.....	1
Burned and sewer.....	2	Lime and ashes.....	2	Fumigated.....	1
Burned and vault.....	1	Chloride.....	2	On the ground..	13
Burned and formaldehyde.....	1	Lime and carbolic.....	2	Not disinfected.....	31
Burned and bichloride.....	1	Sulphur and carbolic.....	1	Unknown.....	158

*Campaign of education by the Michigan State Board of Health for the restriction of consumption in Michigan in 1903.*—In addition to the distribution to health officers, and through them to the families and immediate neighbors of those sick, of documents on the subject of consumption, the State Board issued and widely distributed to teachers and others, bulletins and stereotyped letters and articles upon the restriction and prevention of consumption.

At the Sixth General Conference of Health Officials, held under the auspices of the State Board of Health, at Ann Arbor, January 15 and 16, 1903, Hon. Frank Wells, president of the Board, opened up a general discussion upon the subject of tuberculosis, and its restriction, and urged the necessity for concerted effort toward the establishment of State Sanatoria for consumptives. A bill for this purpose was prepared by the State Board of Health and presented to the legislature, but failed to become a law.

A commendable instance of the application to a community of the general principles of the Michigan plan of campaign for the restriction of consumption is shown in the following extracts from a letter received at the office of the Michigan State Board of Health in July, 1903, from the secretary of the Montreal League for the Prevention of Tuberculosis:

"The Municipal Board of Health supplies us with the services of a permanent sanitary officer, who is made use of as inspector for this League, and acting under our instructions.

"Indigent cases of this disease are usually reported by physicians in private practice or by the out-door physicians of the different hospitals and dispensaries. These are regularly visited by the inspector, who reports to us the needs of each individual case and we attempt to supply all needs, even articles of diet.

"Another method of dealing with the subject has been to have our inspector visit each house where a death has occurred from tuberculosis and try and have the occupants of same house consent to its thorough disinfection:

"As you see there is absolute co-operation between the Municipal Board of Health and this League and each supplies the other with the information which it receives.

"The literature is distributed in the families where reported cases exist by the inspector that we employ, and it is also distributed among the members of this League and their friends, the membership of which is at present quite large.

"Another phase of our work has been the delivering of lectures upon the subject of tuberculosis throughout every church in the city upon a given Sunday evening after service. In this way, last May, we were able to reach no less than an audience of 15,000 upon the same evening, who were addressed by some forty-five physicians who had specially prepared themselves to deal with the subject.

"We also make use of the press, which is regularly supplied with articles dealing with the subject, but this we have found not quite as satisfactory as we had hoped."



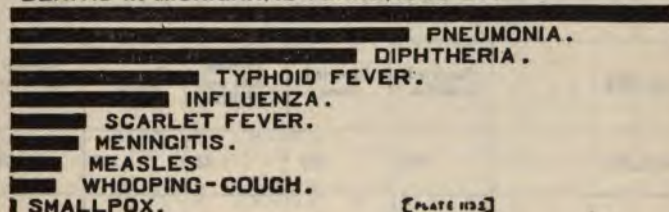
# MENINGITIS IN MICHIGAN IN 1903.

During the year ending December 31, 1903, meningitis was reported to the Secretary of the State Board of Health in 430 localities in Michigan in which there were reported to have occurred 645 cases, including 629 deaths. It thus appears that, as a rule, only the fatal cases were reported. The reports relating to meningitis have been compiled under the various names reported, viz.: cerebro-spinal meningitis, cerebral meningitis, meningitis, spinal meningitis, tubercular meningitis, and traumatic meningitis, endeavoring by such separate statements to study the characteristics of the disease reported under each name, in case any difference statistically can be detected.

Table 1 shows that those cases and deaths reported as from simple meningitis were more numerous than those reported from any other title; and that the cases and deaths reported as from spinal meningitis were less than those reported from any other title excepting traumatic, of which there were fourteen cases, all of which proved fatal.

*The importance of restricting meningitis.*—In recent years, compared with other diseases, meningitis has come to be of much greater importance than formerly. This is graphically shown by comparison of the two diagrams published herewith, Plates 1132 and 1197, the one exhibiting the relative

## DEATHS IN MICHIGAN, 10 YEARS, 1888-97.

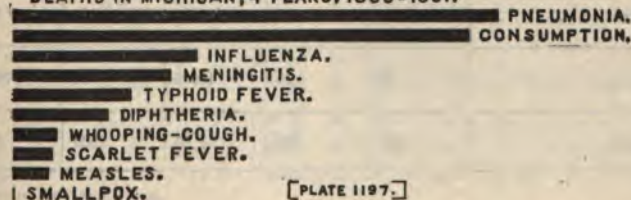


[PLATE 1132]

importance of meningitis compared with other dangerous communicable diseases during the ten years 1888-1897, the other, during the four years 1898-1901. (The first solid line of Plate 1132 represents consumption.)

[The engraver has not conformed to instructions in engraving diagram 1197, therefore it may not be on the same scale as the diagram 1132; but the relative importance of each disease in that period of years is accurately shown.]

## DEATHS IN MICHIGAN, 4 YEARS, 1898-1901.



[PLATE 1197]

Relating to nomenclature, cases in the same locality, same outbreak, having the same symptoms, have been variously called cerebro-spinal meningitis, cerebral meningitis, spinal meningitis, or meningitis. It thus appears that while in some instances a distinction based on certain characteristics of the disease, is made, it more frequently occurs that the above mentioned terms are used indiscriminately in designating any form of the disease, except sometimes the tubercular, and the traumatic. As the prevalence of meningitis in the State has not been general, except during epidemic periods, health officers and physicians have not been given the opportunity of becoming familiar in their general practice with the causes, modes of communication, etc., of this disease as with some of the other communicable diseases whose prevalence each year is common and expected. When a thorough knowledge of this disease becomes general, better and more satisfactory reports may be expected.

As is shown in Table 1, meningitis (including traumatic and tubercular meningitis) was reported present in 430 localities in Michigan in 1903. In these localities 645 cases of sickness were reported to have occurred, of which 629 were fatal; thus indicating that in 1903 as in the four previous years, 1899-1902, as a rule, only fatal cases were reported; there being an average of 1.50 cases of sickness and 1.46 deaths per locality, and a general fatality from meningitis in the State of 97.52 deaths per one hundred cases reported.

TABLE 1.—*Cerebro-spinal meningitis, cerebral meningitis, meningitis, spinal meningitis, tubercular meningitis and traumatic meningitis in Michigan. The number of reported localities, cases and deaths, the average number of cases and deaths per locality, and the per cent of cases which proved fatal in 1903; also the total number of cases and of deaths from meningitis including those reported as tubercular and traumatic meningitis.*

Year 1903.	Reported localities.	Reported cases.	Average cases per locality.	Reported deaths.	Average deaths per locality.	Deaths per 100 cases reported.
Cerebro-spinal meningitis.....	100	143	1.43	135	1.35	94.40
Cerebral meningitis.....	60	81	1.35	80	1.33	98.77
Meningitis.....	143	247	1.73	243	1.70	98.38
Spinal meningitis.....	45	54	1.20	51	1.13	94.44
Total meningitis other than tubercular and traumatic.....	348	525	1.51	509	1.46	96.95
Tubercular meningitis.....	68	106	1.56	106	1.56	100.0
Traumatic meningitis.....	14	14	100.0	14	100.0	100.0
Total meningitis.....	430	645	1.50	629	1.46	97.52



TABLE 2.—Numbers of cases and deaths reported from meningitis,\* tubercular meningitis, traumatic meningitis and the total cases and deaths from all forms of reported meningitis per 100,000 persons living in the State and in each county in Michigan during the year, 1903.

Counties.	Estimated population.†	Meningitis.*				Tubercular meningitis.				Traumatic meningitis.				Total meningitis.			
		No. of re-ported		No. per 100,000 popula-tion of		No. of re-ported		No. per 100,000 popula-tion of		No. of re-ported		No. per 100,000 popula-tion of		No. of re-ported		No. per 100,000 popula-tion of	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
State.....	2,510,652	525	509	20.9	20.3	106	106	4.2	4.2	14	14	.6	.6	645	629	25.7	25.1
Alcona.....	5,826									1	1	17.2	17.2	1	1	17.2	17.2
Alger.....	8,103	1	1	12.3	12.3									1	1	12.3	12.3
Allegan.....	38,624	4	3	10.4	7.8	1	1	2.6	2.6					5	4	12.9	10.4
Alpena.....	18,521																
Antrim.....	18,632	6	6	32.2	32.2									6	6	32.2	32.2
Arenac.....	11,258																
Baraga.....	4,365	2	2	45.8	45.8									2	2	45.8	45.8
Barry.....	21,921	6	5	27.4	22.8	1	1	4.6	4.6	1	1	4.6	4.6	8	7	36.5	32.0
Bay.....	62,912	9	9	14.3	14.3	1	1	1.6	1.6					10	10	15.9	15.9
Benzie.....	10,489																
Berrien.....	50,926	8	8	15.7	15.7	4	4	7.8	7.8	1	1	2.0	2.0	13	13	25.5	25.5
Branch.....	28,609	5	5	17.5	17.5	1	1	3.5	3.5	1	1	3.5	3.5	7	7	24.5	24.5
Calhoun.....	50,233	12	12	23.9	23.9									12	12	23.9	23.9
Cass.....	20,726	2	2	9.6	9.6	1	1	4.8	4.8					3	3	14.5	14.5
Charlevoix.....	15,099	3	3	19.9	19.9	1	1	6.6	6.6					4	4	26.5	26.5
Cheboygan.....	16,413	4	4	24.4	24.4									4	4	24.4	24.4
Chippewa.....	24,338	8	8	32.9	32.9	1	1	4.1	4.1	1	1	4.1	4.1	10	10	41.1	41.1
Clare.....	8,549	1	1	11.7	11.7									1	1	11.7	11.7
Clinton.....	24,573	4	4	16.3	16.3									4	4	16.3	16.3
Crawford.....	3,057																
Delta.....	26,185	6	6	22.9	22.9									6	6	22.9	22.9
Dickinson.....	19,463	4	4	20.6	20.6	1	1	5.1	5.1					5	5	25.7	25.7
Eaton.....	31,195	8	8	25.6	25.6									8	8	25.6	25.6
Emmet.....	18,700	8	8	42.8	42.8	1	1	5.3	5.3					9	9	48.1	48.1
Genesee.....	42,428	8	8	18.9	18.9									8	8	18.9	18.9
Gladwin.....	7,392																
Gogebie.....	18,064	1	1	5.5	5.5	2	2	11.1	11.1	1	1	5.5	5.5	4	4	22.1	22.1
Grand Traverse.....	21,958	6	5	27.3	22.8	1	1	4.6	4.6					7	6	31.9	27.3
Gratiot.....	30,444	15	14	49.3	46.0									15	14	49.3	46.0
Hillsdale.....	29,662	2	2	6.7	6.7	1	1	3.4	3.4					3	3	10.1	10.1
Houghton.....	76,998	25	25	32.5	32.5	13	13	16.9	16.9					38	38	49.4	49.4
Huron.....	35,113	8	7	22.8	19.9	1	1	2.8	2.8	1	1	2.8	2.8	10	9	28.5	25.6
Ingham.....	39,881	5	5	12.5	12.5	2	2	5.0	5.0					7	7	17.6	17.6
Ionia.....	34,084	5	5	14.7	14.7	1	1	2.9	2.9					6	6	17.6	17.6
Iosco.....	9,201	2	2	21.7	21.7									2	2	21.7	21.7
Iron.....	10,835																
Isabella.....	23,453	3	3	12.8	12.8	4	4	17.1	17.1					7	7	29.8	29.8
Jackson.....	49,062	12	12	24.5	24.5	4	4	8.2	8.2	1	1	2.0	2.0	17	17	34.7	34.7
Kalamazoo.....	45,435	14	13	30.8	28.6	2	2	4.4	4.4					16	15	35.2	33.0
Kalkaska.....	7,877	1	1	12.7	12.7									1	1	12.7	12.7
Kent.....	133,596	30	27	22.5	20.2	9	9	6.7	6.7					39	36	29.2	26.9

\*. †. These notes are on the next page.



TABLE 2.—CONCLUDED.

Counties.	Estimated population.†	Meningitis.*				Tubercular meningitis.				Traumatic meningitis.				Total meningitis.			
		No. of reported		No. per 100,000 population of		No. of reported		No. per 100,000 population of		No. of reported		No. per 100,000 population of		No. of reported		No. per 100,000 population of	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Keweenaw.....	3,421	1	1	29.2	29.2	.....	.....	.....	.....	.....	.....	.....	.....	1	1	29.2	29.2
Lake.....	4,487	2	1	44.6	22.3	.....	.....	.....	.....	.....	.....	.....	.....	2	1	44.6	22.3
Lapeer.....	27,024	3	3	11.1	11.1	.....	.....	.....	.....	.....	.....	.....	.....	3	3	11.1	11.1
Leelanau.....	11,045	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lenawee.....	48,338	4	4	8.3	8.3	3	3	6.2	6.2	.....	.....	.....	.....	7	7	14.5	14.5
Livingston.....	19,278	1	1	5.2	5.2	.....	.....	.....	.....	.....	.....	.....	.....	1	1	5.2	5.2
Luce.....	3,298	3	3	91.0	91.0	.....	.....	.....	.....	.....	.....	.....	.....	3	3	91.0	91.0
Mackinac.....	7,934	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Macomb.....	33,670	9	9	26.7	26.7	.....	.....	.....	.....	.....	.....	.....	.....	9	9	26.7	26.7
Manistee.....	28,723	6	5	20.9	17.4	.....	.....	.....	.....	1	1	3.5	3.5	7	6	24.4	20.9
Marquette.....	42,850	8	8	18.7	18.7	4	4	9.3	9.3	.....	.....	.....	.....	12	12	28.0	28.0
Mason.....	19,113	2	2	11.0	11.0	.....	.....	.....	.....	.....	.....	.....	.....	2	2	11.0	11.0
Mecosta.....	20,675	6	6	29.0	29.0	.....	.....	.....	.....	.....	.....	.....	.....	6	6	29.0	29.0
Menominee.....	27,593	14	14	50.7	50.7	3	3	10.9	10.9	.....	.....	.....	.....	17	17	61.6	61.6
Midland.....	15,048	3	3	19.9	19.9	.....	.....	.....	.....	.....	.....	.....	.....	3	3	19.9	19.9
Missaukee.....	10,478	3	3	28.6	28.6	.....	.....	.....	.....	.....	.....	.....	.....	3	3	28.6	28.6
Monroe.....	32,542	8	8	24.6	24.6	1	1	3.1	3.1	1	1	3.1	3.1	10	10	30.7	30.7
Montcalm.....	32,053	6	4	18.7	12.5	.....	.....	.....	.....	.....	.....	.....	.....	6	4	18.7	12.5
Montmorency.....	3,630	1	1	27.5	27.5	.....	.....	.....	.....	.....	.....	.....	.....	1	1	27.5	27.5
Muskegon.....	36,932	5	5	13.5	13.5	.....	.....	.....	.....	.....	.....	.....	.....	5	5	13.5	13.5
Newaygo.....	16,948	4	4	23.5	23.5	.....	.....	.....	.....	.....	.....	.....	.....	4	4	23.5	23.5
Oakland.....	45,848	4	4	8.7	8.7	.....	.....	.....	.....	.....	.....	.....	.....	4	4	8.7	8.7
Oceana.....	17,665	4	4	22.6	22.6	1	1	5.7	5.7	.....	.....	.....	.....	5	5	28.3	28.3
Ogemaw.....	8,827	2	2	22.7	22.7	.....	.....	.....	.....	.....	.....	.....	.....	2	2	22.7	22.7
Ontonagon.....	5,859	2	2	34.1	34.1	1	1	17.1	17.1	.....	.....	.....	.....	3	3	51.2	51.2
Osceola.....	18,549	3	3	16.2	16.2	1	1	5.4	5.4	.....	.....	.....	.....	4	4	21.6	21.6
Oscoda.....	1,300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Otsego.....	6,862	1	1	14.6	14.6	.....	.....	.....	.....	.....	.....	.....	.....	1	1	14.6	14.6
Ottawa.....	39,955	3	2	7.5	5.0	2	2	5.0	5.0	.....	.....	.....	.....	5	4	12.5	10.0
Presque Isle.....	10,270	2	2	19.5	19.5	.....	.....	.....	.....	.....	.....	.....	.....	2	2	19.5	19.5
Rosecommon.....	1,850	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Saginaw.....	80,911	13	13	16.1	16.1	7	7	8.7	8.7	.....	.....	.....	.....	20	20	24.7	24.7
Sanilac.....	35,607	11	11	30.9	30.9	3	3	8.4	8.4	.....	.....	.....	.....	14	14	39.3	39.3
Schoolcraft.....	8,267	1	1	12.1	12.1	.....	.....	.....	.....	.....	.....	.....	.....	1	1	12.1	12.1
Shiawassee.....	34,370	8	8	23.3	23.3	.....	.....	.....	.....	.....	.....	.....	.....	8	8	23.3	23.3
St. Clair.....	55,678	12	12	21.6	21.6	2	2	3.6	3.6	1	1	1.8	1.8	15	15	26.9	26.9
St. Joseph.....	23,290	2	2	8.6	8.6	1	1	4.3	4.3	.....	.....	.....	.....	3	3	12.9	12.9
Tuscola.....	36,625	4	4	10.9	10.9	3	3	8.2	8.2	.....	.....	.....	.....	7	7	19.1	19.1
Van Buren.....	34,375	5	5	14.5	14.5	1	1	2.9	2.9	1	1	2.9	2.9	7	7	20.4	20.4
Washtenaw.....	49,885	10	10	20.0	20.0	4	4	8.0	8.0	.....	.....	.....	.....	14	14	28.1	28.1
Wayne.....	376,951	105	103	27.9	27.3	15	15	4.0	4.0	2	2	.5	.5	122	120	32.4	31.8
Wexford.....	18,240	6	6	32.9	32.9	1	1	5.5	5.5	.....	.....	.....	.....	7	7	38.4	38.4

\* Includes cerebro meningitis, cerebro-spinal meningitis, spinal meningitis and meningitis.

† Population estimated by average annual increase (arithmetical method), based on the State Census of 1894 and the U. S. Census of 1900.

*Distribution of reported meningitis by counties throughout the State.*—Table 2 shows the amount of reported sickness and deaths in each county in the State during the year 1903, from all meningitis. The county having the greatest number of reported cases of sickness and of deaths was Wayne, where 122 cases, of which 120 died, were reported to have occurred. From each of nine counties in the State, Alcona, Alger, Clare, Kalkaska, Keweenaw, Livingston, Montmorency, Otsego and Schoolcraft, there was reported but one fatal case.

It is shown in Table 2, that the highest death-rate (91.0) was in Luce county, and the next highest death-rate (61.6) was in Menominee county. The lowest death-rate (5.2) was in Livingston county. The highest death-rate in tubercular meningitis (17.1) was in Isabella and Ontonagon counties. No case was reported as having occurred in the counties of Alpena, Arenac, Benzie, Crawford, Gladwin, Iron, Leelanau, Mackinac, Oscoda and Roscommon.

Table 3 shows a decrease in the prevalence of meningitis since 1899, the epidemic year.

Good authorities state that, with reference to measures for its restriction, epidemic cerebro-spinal meningitis should be placed in the same category as phthisis pulmonalis, and effective effort should be exercised in the restriction and prevention of this disease as in other dangerous communicable diseases. It is, therefore, desirable to have all cases occurring in the State reported in detail to the Secretary of the State Board of Health, that the compilation of statistics relating to this disease may be more complete and useful.

TABLE 3.—*Exhibiting for the years 1899-1903, a comparison of all forms of meningitis in the numbers of reported localities, cases and deaths, the average numbers of cases and deaths per locality; and the per cent of reported cases which proved fatal in each of the years.*

Year.	Reported localities.	Reported cases.	Average cases per locality.	Reported deaths.	Average deaths per locality.	Deaths per 100 cases reported.*
1899.....	544	1,306	2.40	1,079	1.98	82.62
1900.....	451	747	1.66	688	1.53	92.10
1901.....	409	614	1.50	594	1.45	96.74
1902.....	394	632	1.60	598	1.52	94.62
1903.....	430	645	1.50	630	1.47	97.67

\* It is to be regretted that, as a rule, the cases were not reported,—practically only those which prove fatal.

*Reported meningitis by months.*—This first line in Table 4 exhibits the number of cases which began in each month of the year 1903. The second line of figures exhibits the number of cases reported sick in any part of each month. As some of the cases were sick longer than one month, they are included in the cases sick in more than one month, therefore the sum of the cases sick in all the months exceeds the total of reported cases in 1903. The last line of Table 4 gives, by months, the average temperature at sta-

tions in Michigan, in 1903, which may serve, in a limited way, as a basis for showing the relation of the prevalence of meningitis to temperature.

TABLE 4.—*Exhibiting the number of cases of meningitis which began and the number which were present in each month of the year 1903, in Michigan. Compiled from reports to this office by health officers and physicians. Also, by months, the average temperature, at stations in Michigan, in 1903.*

Cases.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Began.....	41	34	45	35	48	28	46	43	51	40	32	34
Present.....	86	87	102	78	99	76	84	78	83	76	64	56
Av. Temperature.....	22.74	23.74	39.45	44.39	58.23	61.38	69.84	64.69	60.73	50.74	34.55	21.26

By Table 5 it may be seen that the maximum number of deaths from total meningitis occurred in March, and the minimum in January and April.

TABLE 5.—*Exhibiting the number and per cent of deaths from meningitis in Michigan in each month of the year 1903.*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Deaths from total meningitis.....	39	51	72	39	60	45	57	53	55	50	50	56	*628
Per cent of deaths.....	6.2	8.1	11.5	6.2	9.6	7.2	9.1	8.4	8.8	8.0	8.0	8.9	.....
Deaths from meningitis†.....	31	38	59	33	52	39	43	47	47	37	40	42	508
Per cent of deaths.....	6.1	7.5	11.6	6.5	10.2	7.7	8.5	9.3	9.3	7.3	7.9	8.3	.....
Deaths from tubercular meningitis.....	8	12	13	5	8	7	12	5	5	12	7	12	109
Per cent of deaths.....	7.5	11.3	12.3	4.7	7.5	6.6	11.3	4.7	4.7	11.3	6.6	11.3	.....
Deaths from traumatic meningitis.....	.....	1	.....	1	.....	.....	2	1	3	1	3	2	14
Per cent of deaths.....	.....	7.1	.....	7.1	.....	.....	14.3	7.1	21.4	7.1	21.4	14.3	.....

\* The date of one of these deaths was not reported.

† Includes meningitis, cerebro-spinal meningitis, cerebral meningitis, and spinal meningitis.

*Ages of fatal and non-fatal cases of meningitis.*—Of the 504 persons who died of meningitis in the State during the year 1903, the ages of whom were reported to this office, the largest percentage of deaths, fifty-eight per cent, were of ages under five years; and sixty-six per cent died at ages under nine



years, indicating that the disease exists largely among children. The average age of decedents included under the title meningitis was, for males 8.5, and for females 12.1 years.

Of the 106 persons who died of tubercular meningitis in the State during the year 1903, the ages of whom were reported to this office, the largest percentage of deaths, fifty-eight per cent, were of ages under five years; and seventy-four per cent died at ages under nine years. The average age of decedents from tubercular meningitis was, for males 5.8 and for females 11.7 years.

TABLE 6.—*Exhibiting by sex, in certain age-groups, the reported number of deaths from meningitis\* and tubercular meningitis and the per cent the deaths in each group were of the total number of deaths reported for the disease; also the average age of fatal cases and total number of deaths included. Compiled from such reports for the year 1903 which stated the age.*

Meningitis.*															
Year.	Sex.	Average age of fatal cases.	Number of cases included.	Age.—In periods of years. Number and per cent of fatal cases in each period of age.											
				All ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1903.	Males.....	8.5	269	.....	157	28	13	12	6	9	7	7	6	4	20
	Females....	12.1	235	.....	133	17	19	13	10	7	9	3	6	2	16
1903.	Per cent the fatal cases in each age-group were of all fatal cases of known ages.....			100	58	10	5	4	2	3	3	3	2	1	7
				100	57	7	8	6	4	3	4	1	3	.9	7
Tubercular meningitis.															
Year.	Sex.	Average age of fatal cases.	Number of cases included.	Age.—In periods of years. Number and per cent of fatal cases in each period of age.											
				All ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1903.	Males.....	5.8	51	.....	32	10	3	2	0	1	1	0	0	1	0
	Females....	11.7	55	.....	29	7	2	5	2	1	2	1	3	0	3
1903.	Per cent the fatal cases in each age-group were of all fatal cases of known ages.....			100	63	20	6	4	4	0	2	0	0	2	0
				100	53	13	4	9	4	2	4	2	5	0	5

\* Includes cerebral meningitis, cerebro-spinal meningitis, spinal meningitis and meningitis.

Table 7 shows that but eleven cases, of whom the ages were reported to this office, recovered from meningitis. The limited number of non-fatal cases reported makes impossible, in a single year, a satisfactory study of the ages of non-fatal cases; but the table may serve as a starting point.

TABLE 7.—*Exhibiting by sex, in certain age-groups, the reported number of persons who recovered from meningitis\* in Michigan during the year 1903; also the average age and number of cases included. Compiled from all reports for the year 1903 which stated the age.*

Meningitis.*															
Year	Sex.	Average age of non-fatal cases, years.	Number of cases included.	Age.—In periods of years. Number and per cent of (non-fatal) cases in each period of age.											
				All ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1903.	Males.....	8.0	8	.....	4	2	1	0	0	1	0	0	0	0	0
	Females....	6.3	3	.....	2	0	0	1	0	0	0	0	0	0	0
1903.	Per cent the non-fatal cases in each age-group were of all non-fatal cases of known ages...			100	50	25	13	0	0	13	0	0	0	0	0
				100	67	0	0	33	0	0	0	0	0	0	0

\* Includes cerebral meningitis, cerebro-spinal meningitis, spinal meningitis and meningitis.

TABLE 8.—*Exhibiting by sex of patient the duration in days of fatal cases of sickness from meningitis\* and tubercular meningitis, in Michigan in the year 1903. The number and per cent of deaths arranged in five day groups. Compiled from those reports which stated the length of time the patient was sick.*

Meningitis.*															
Year.	Sex.	Average duration of fatal cases.	Number of cases included.	Duration of sickness.—Number and per cent of fatal cases in each period of days.											
				All periods.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 days and over.
1903.	Males.....	11.4	211	.....	90	44	29	19	12	3	3	1	3	1	6
	Females....	11.4	170	.....	59	53	31	10	1	2	2	3	2	1	6
1903.	Per cent of deaths in each period of age.....			100	43	21	14	9	6	1	1	.5	1	.5	3
				100	35	31	18	6	.6	1	1	2	1	.6	4

## Tubercular meningitis.

Year.	Sex.	Average duration of fatal cases.	Number of cases included.	Duration of sickness.—Number and per cent of fatal cases in each period of days.											
				All periods.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 days and over.
1903.	Males.....	18.3	34	.....	8	7	6	5	2	2	0	1	0	0	3
	Females....	19.8	38	.....	7	8	6	6	4	0	1	1	0	1	4
1903.	Per cent of deaths in each period of age.....			100	24	21	18	15	6	6	0	3	0	0	9
				100	18	21	16	16	11	0	3	3	0	3	11

\* Includes cerebral meningitis, cerebro-spinal meningitis, spinal meningitis and meningitis.



TABLE 9.—*Exhibiting by sex of patients and by number and per cent, the duration in days of non-fatal cases of sickness from meningitis\* in Michigan, during the year 1903. Compiled from those reports which stated the time the patient was sick.*

Meningitis.*															
Year.	Sex.	Average duration of non-fatal cases.	Number of cases included.	Duration of sickness.—Number and per cent of non-fatal cases in each period of age.											
				All periods.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 days and over.
1903.	Males.....	36.75	8	.....	0	0	2	1	2	0	0	0	0	0	3
	Females....	28.66	3	.....	0	1	0	0	0	1	0	0	0	1	0
1903.	Per cent of non-fatal cases in each period of age.....			100	0	0	25	13	25	0	0	0	0	0	38
				100	0	33	0	0	0	33	0	0	0	33	0

\* Includes meningitis reported as cerebral meningitis, cerebro-spinal meningitis, spinal meningitis, and meningitis.

*Duration of sickness of fatal and non-fatal cases of meningitis.*—Table 8 shows that for the year 1903 the average duration of fatal cases of meningitis was for males 11.4 days, and for females 11.4 days.

The average duration of fatal cases of tubercular meningitis was for males 18.3 days, and for females 19.8 days.

In Table 9 it may be noticed that the duration of but eleven non-fatal cases were reported which indicates (as in Table 7, relative to the age of non-fatals) that a too limited number of non-fatal cases are reported to obtain from the cases in a single year any valuable conclusions on the duration of sickness from the disease.

*Source of contagium of meningitis.*—Table 10 is an attempt to learn something of the source of contagium of the disease. In 1903, as in the four preceding years, 1899-1902, it has been difficult to obtain information on this question. As can be seen by this table, of the 645 cases of meningitis which occurred in the State in 1903, in 491 instances the source of contagium was not reported by the local health officer, or the source was ill defined, or reported as "unknown." Of the remaining cases, 52 were attributed to some of the diseases which usually prevail during cold weather; 34 to some of the diseases which usually prevail during warm weather; 37 to some of the dangerous communicable diseases; four to a previous case, and the remainder to a variety of causes.

It must be seldom that the spread of meningitis can be traced directly to a preceding case of meningitis. In fact, to the Secretary of the State Board of Health, it seems that it may be seldom that meningitis is spread directly from a well-developed case of meningitis; because he sees no way whereby the germs can pass from the coverings of the brain and spinal cord of one person to those of another person. Probably the germs enter the body by way of the nose and throat, and that they are spread from the nose and throat of the infected person. After meningitis is developed the germs may no longer be present in the nose or throat. In Table 10 it may be seen that only four out of 645 cases were traced to a former case.



## CAUSE, OR SOURCE OF CONTAGIUM OF MENINGITIS.

TABLE 10.—*Exhibiting, for each of the differently named sorts of meningitis in Michigan, in 1903, the reported cause, origin, or source of contagium.*

Alleged source, origin, or cause.	Total meningitis.	Cerebral meningitis.	Cerebro-spinal meningitis.	Meningitis.	Spinal meningitis.	Tubercular meningitis.
Not stated.....	332	40	68	142	31	53
Ill defined.....	6	1	3	2	0	0
Unknown.....	153	24	44	47	6	32
Outside jurisdiction.....	1	0	0	0	0	0
Cold.....	8	0	5	2	0	1
Pneumonia.....	8	1	3	3	0	1
Influenza.....	5	2	1	2	0	0
Bronchitis.....	3	1	1	1	0	0
Tonsillitis.....	1	0	1	0	0	0
Middle ear disease.....	8	3	0	4	1	0
Rheumatism.....	1	0	0	1	0	0
Cholera infantum.....	8	2	1	2	3	0
Intestinal diseases.....	7	0	1	2	0	0
Stomach trouble.....	2	0	0	2	0	0
Diarrhea.....	2	0	1	1	0	0
Dysentery.....	1	0	0	1	0	0
Measles.....	5	1	3	1	0	0
Whooping-cough.....	5	1	0	2	0	0
Scarlet fever.....	1	0	0	0	0	0
Erysipelas.....	1	0	0	1	0	0
Cancer.....	2	1	0	1	0	0
Tumor.....	1	0	0	0	1	0
Typhoid fever.....	1	0	0	0	0	1
Syphilis.....	3	0	0	3	0	0
Tuberculosis.....	7	0	0	3	1	3
Consumption in family.....	9	1	0	1	0	7
Enlarged glands.....	3	0	0	0	0	3
Scrofula.....	1	0	0	0	0	1
Appendicitis.....	1	0	0	0	0	1
Bright's disease.....	1	0	0	1	0	0
Paralysis.....	1	0	0	1	0	0
Locomotor ataxia.....	1	0	0	1	0	0
Hydrocephalus.....	1	0	0	1	0	0
Spina bifida.....	1	0	0	0	1	0
Septicæmia.....	2	0	1	1	0	0
Ulcerated tooth.....	2	1	0	1	0	0
Teething.....	3	0	1	1	1	0
Congenital.....	2	0	0	0	2	0
Injury.....	*28	2	3	3	6	0
Result of operation.....	2	0	0	2	0	0
Childbirth.....	2	0	0	2	0	0
Despondency.....	2	0	0	2	0	0
Alcoholism.....	1	0	1	0	0	0
Poorly nourished.....	1	0	0	0	1	0
Overwork.....	2	0	1	1	0	0
Unsanitary conditions.....	2	0	1	1	0	0
Traced to a former case.....	4	0	3	1	0	0
Infected article.....	1	0	0	0	0	1

\* This number includes fourteen of traumatic.

There are two quite distinct views possible as to the causation of meningitis. Prominent medical authors seem to consider that epidemic cerebro-spinal meningitis is caused by one specific micro-organism,—the diplococcus intracellularis meningitidis. Another view is that the micro-organism of any inflammatory disease to which the human body is subject, if it gains access to the meninges may cause meningitis. According to this view a person sick with any such communicable disease as pneumonia, influenza, or tuber-

culosis, may be the source of the germs which in the same or another person may cause meningitis. According to this view, whenever those diseases are epidemic or unusually prevalent, meningitis is also likely to be unusually prevalent, because the same conditions in the environment, such as the meteorological conditions, which tend to favor the introduction into human bodies of the germs of the other communicable diseases may also tend to favor the introduction of the diplococcus of meningitis. The statistics in this State have, several times, illustrated the truth of this proposition.

#### TYPHOID FEVER IN MICHIGAN DURING THE YEAR ENDING DECEMBER 31, 1903.

During the year ending December 31, 1903, there were reported to the Secretary of the State Board of Health 929 outbreaks of typhoid fever in 702 localities in Michigan in which there were reported to have occurred 2,840 cases, including 640 deaths. Of these deaths, 36 were reported to have been from typhoid pneumonia.

Notwithstanding the marked improvement secured both in promptness and in accuracy of reports of local health officials to the central office, not all cases of sickness from typhoid fever are yet reported. For instance, in 1903, in Bay City, Sault Ste. Marie, Battle Creek and Detroit, only the deaths were reported. Statistics of the relation of deaths to cases in hospitals generally indicate that usually there are about ten cases to one death; therefore it is probable that there occurred in Michigan in 1903, about six thousand three hundred and ninety cases of typhoid fever. Reports of all cases cannot be made by local health officers until the people generally fully understand the need of reporting to the local health officer every case of sickness from this "disease dangerous to the public health," for such typhoid fever really is. The restriction of the disease cannot be effected until such reports are made; as soon as the people generally shall coöperate, the disease will be restricted.

Not only about one-half of the cases, but not even all the deaths are reported directly to the office of the Secretary of the State Board of Health by local health officers.

The Vital Statistics Division of the State Department reports to the State Board of Health each month the deaths from dangerous communicable diseases, including typhoid fever, typho-malarial fever and typhoid pneumonia; therefore, a considerable proportion of the deaths shown to have been reported to the State Board of Health were first reported to the State Department. It is believed that nearly all deaths that occur are now, under the new law, reported to the Secretary of State; and of these about two-thirds of all the deaths, reported to the Secretary of State, are found to have been previously reported as cases of sickness to the Secretary of the State Board of Health, nearly all of them promptly as the cases occurred. And the proportion of the deaths found to have been reported as cases of sickness is constantly increasing.

*Definition of the term "outbreak" as used in this article.*—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases



of a particular communicable disease within any health officer's jurisdiction, whether city, village or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over sixty days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area.

#### TYPHOID FEVER IN 1903 COMPARED WITH PREVIOUS YEARS.

Comparisons with previous years, to ascertain the comparative increase or decrease of the prevalence of typhoid fever in this State, are interesting and instructive, and they would be more so if there existed a fixed basis on which to found such comparisons. From year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports, and in the efforts made by the local health officials throughout the State to furnish in their reports the information desired by the State Board. It is, however, still impossible to determine the exact increase or decrease of prevalence of the disease in this State by comparisons of the numbers of outbreaks of the disease, and the cases reported to this office year by year. But by means of the statistics of *deaths* it will soon be possible to make comparisons one year with another; because under the new law nearly all the deaths are returned to the Secretary of State, and by using the statistics of those in connection with the statistics of the office of the State Board of Health, a basis of comparison of the years will soon be possible. Some of the difficulties in the way of the immediate accomplishment of this are the different methods of compiling in the two offices; thus, for instance, a few deaths considered by the office of the State Board of Health as from typhoid fever were *probably* compiled in the State Department as from pneumonia, the returns reading "typhoid pneumonia."

A COMPARISON OF DEATHS FROM TYPHOID FEVER IN MICHIGAN DURING THE YEAR 1903 REPORTED TO THE OFFICE OF THE STATE BOARD OF HEALTH, WITH THOSE REPORTED TO THE DIVISION OF VITAL STATISTICS, IN THE STATE DEPARTMENT.

##### *Reported to the State Board of Health.*

Deaths from typhoid fever, typhoid pneumonia, and typho-malarial fever in 1903 (also includes those deaths reported first to the Secretary of State)..... 640

##### *Reported to the State Department, Division of Vital Statistics.*

Deaths from typhoid fever in 1903 (includes typho-malarial fever)..... 594

The foregoing statement is based upon the ephemeral publication, the Bulletin of Vital Statistics; the final compilation of typhoid fever by the State Department Division of Vital Statistics in 1903 has not yet been completed, so that the figures given (594) may be changed later, because where two



diseases are mentioned as causing a death, as not infrequently occurs, not always the same one is used in the final compilation as in the Bulletin of Vital Statistics.

The facts exhibited in Table 1, show that while there were more outbreaks of typhoid fever in 1903 than the average for the seventeen years 1886-1902, the number of cases was less, also the numbers of cases and deaths per outbreak were less than the average numbers of cases and deaths per outbreak for the period of years, indicating that the efforts for the restriction of this disease are having their proper effect. The fact that the number of final reports received in 1903 was nearly double the average number received for the seventeen years, indicates better effort on the part of local health officers in restricting typhoid fever. The fatality for 1903 was higher than the average fatality for the period of years 1886-1902.

TABLE 1.—TYPHOID FEVER.—*Exhibiting the numbers of outbreaks, localities, cases and deaths reported for the year 1903; also for the years 1886-1902 the average reported outbreaks, localities, cases and deaths, and the average cases and deaths per outbreak, the deaths per 100 cases, and the number of special final reports received.*

Year.	Outbreaks reported.	Localities reported.	Cases reported.	Deaths reported.	Average cases per outbreak.	Average deaths per outbreak.	Deaths per 100 cases.	Final reports received.
1903.....	929	702	2,840	640	3.06	.69	23	684
Averages, 1886-1902.....	621	525	2,880	522	4.64	.84	18	378

*Sickness-rates from reported typhoid fever in 1903.*—The reporting of cases of typhoid fever is not yet as complete as the reporting of deaths from that disease, therefore any comparisons made should be subject to the mental reservation that not all cases are reported, and that the omissions are greater in some parts of the State than in others.

Table 2 shows that the sickness-rate of typhoid fever for the State in 1903, exclusive of the population and cases in Bay City, Sault Ste. Marie, Battle Creek and Detroit, where only fatal cases were reported, was 128.0 per 100,000 population. The county having the greatest reported sickness-rate was Otsego with 495.5 cases per 100,000 population—nearly four times the average rate for the State. The lowest sickness-rate, 8.9 per 100,000 population, was in Arenac county. Ogemaw (11.3) and Alger (12.3) had the next lowest rates.

*Death-rates from reported typhoid fever in 1903.*—The death-rates are now believed to be fairly accurate. Table 2 shows that the death-rate from reported typhoid fever in 1903, for the State, was 25.5 per 100,000 of population. The county having the highest death-rate (102.0) was Otsego, and that having the lowest (where deaths occurred), 2.8 deaths per 100,000 population, was Huron.

*Typhoid fever in each month of the year 1903.*—The last line in Table 3 shows the number of outbreaks present in each month of the year. As many of the outbreaks lasted more than one month they are counted in each month of their duration; consequently the sum of the outbreaks present in the several months exceeds the total number of reported outbreaks.



TABLE 2.—Numbers of cases and deaths reported from typhoid fever, and the cases and deaths per 100,000 persons living in each county in Michigan during the year 1903. Compiled from reports of health officers, etc.

State and counties.	Estimated population of Michigan for 1903.*	Number of reported		Number per 100,000 population, of		Counties.	Estimated population of Michigan for 1903.*	Number of reported		Number per 100,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,510,652	2,840	640	†128.0	25.5						
Alcona.....	5,826	2	2	34.3	34.3	Keweenaw.....	3,421	0	0	0	0
Alger.....	8,103	1	1	12.3	12.3	Lake.....	4,487	0	0	0	0
Allegan.....	38,624	26	8	67.3	20.7	Lapeer.....	27,024	32	7	118.4	25.9
Alpena.....	18,521	12	5	64.8	27.0	Leelanau.....	11,045	3	1	27.2	9.1
Antrim.....	18,632	28	8	150.3	42.9	Lenawee.....	48,338	63	11	130.3	22.8
Arenac.....	11,258	1	1	8.9	8.9	Livingston.....	19,278	31	3	160.8	15.6
Baraga.....	4,365	3	1	68.7	22.9	Luce.....	3,298	5	3	151.6	100.0
Barry.....	21,921	19	4	86.7	18.2	Mackinac.....	7,934	9	1	113.4	12.6
Bay.....	62,912	26	20	†32.9	31.8	Macomb.....	33,670	40	1	118.8	3.0
Benzie.....	10,489	22	5	209.7	47.7	Manistee.....	28,723	50	10	174.1	34.8
Berrien.....	50,925	45	12	88.4	23.6	Marquette.....	42,850	49	11	114.4	25.7
Branch.....	28,609	20	2	69.9	7.0	Mason.....	19,113	5	2	26.2	10.5
Calhoun.....	50,233	33	11	†76.3	21.9	Mecosta.....	20,675	9	3	43.5	14.5
Cass.....	20,726	27	6	130.3	28.9	Menominee.....	27,593	122	12	442.1	43.5
Charlevoix.....	15,099	16	6	106.0	39.7	Midland.....	15,048	11	2	73.1	13.3
Cheboygan.....	16,413	19	1	115.8	6.1	Missaukee.....	10,478	16	0	152.7	0
Chippewa.....	24,338	26	16	†123.4	65.7	Monroe.....	32,542	24	9	73.8	27.7
Clare.....	8,549	7	1	81.9	11.7	Montcalm.....	32,053	34	9	106.1	28.1
Clinton.....	24,573	43	6	175.0	24.4	Montmorency.....	3,630	3	1	82.6	27.5
Crawford.....	3,057	9	2	294.4	65.4	Muskegon.....	36,932	25	7	67.7	19.0
Delta.....	26,185	33	9	126.0	34.4	Newaygo.....	16,948	12	5	70.8	29.5
Dickinson.....	19,463	17	5	87.3	25.7	Oakland.....	45,848	46	6	100.3	13.1
Eaton.....	31,195	86	11	275.7	35.3	Oceana.....	17,665	14	3	79.3	17.0
Emmet.....	18,700	21	6	112.3	32.1	Ogemaw.....	8,827	1	1	11.3	11.3
Genesee.....	42,428	83	16	195.6	37.7	Ontonagon.....	5,859	9	0	153.6	0
Gladwin.....	7,392	8	0	108.2	0	Osceola.....	18,549	14	2	75.5	10.8
Gogebic.....	18,064	4	1	22.1	5.5	Oscoda.....	1,300	1	0	76.9	0
Grand Traverse...	21,958	34	3	154.8	13.7	Otsego.....	6,862	34	7	495.5	102.0
Gratiot.....	30,444	85	9	279.2	29.6	Ottawa.....	39,955	32	9	80.1	22.5
Hilldale.....	29,662	27	8	91.0	27.0	Presque Isle...	10,270	13	7	126.6	68.2
Houghton.....	76,998	26	13	33.8	16.8	Roscommon.....	1,850	3	1	162.2	54.1
Huron.....	35,113	40	1	113.9	2.8	Saginaw.....	80,911	67	7	82.9	8.7
Ingham.....	39,881	118	24	295.9	60.2	Sanilac.....	35,607	25	10	70.2	28.1
Ionia.....	34,084	58	13	170.2	38.1	Schoolcraft.....	8,267	2	1	24.2	12.1
Iosco.....	9,201	4	3	43.5	32.6	Shiawassee.....	34,370	34	9	98.9	26.2
Iron.....	10,835	2	2	18.5	18.5	St. Clair.....	55,678	49	14	88.0	25.1
Isabella.....	23,453	36	7	153.5	29.8	St. Joseph.....	23,290	12	4	51.5	17.2
Jackson.....	49,062	74	10	150.8	20.4	Tuscola.....	36,625	28	5	76.5	13.7
Kalamazoo.....	45,435	134	15	294.9	33.0	Van Buren.....	34,375	84	14	244.4	40.7
Kalkaska.....	7,877	13	2	165.0	25.4	Washtenaw.....	49,885	40	11	80.2	22.0
Kent.....	133,596	287	51	214.8	38.2	Wayne.....	376,951	155	97	†138.1	25.7
						Wexford.....	18,240	59	7	323.5	38.3

\* Population estimated by average annual increase (arithmetical method), based on the State Census of 1894 and the U. S. Census of 1900.

† This rate is computed exclusive of the population and cases in Bay City, Sault Ste. Marie, Battle Creek, and Detroit, because fourteen fatal cases only were reported from Bay City, eleven fatal cases from Sault Ste. Marie, ten fatal cases from Battle Creek, and sixty-two fatal cases from Detroit.

‡ The case-rates in the counties of Bay, Chippewa, Calhoun and Wayne, are computed exclusive of the population and cases in Bay City Sault Ste. Marie, Battle Creek and Detroit, in their respective counties, because only fatal cases were reported from these cities.

TABLE 3.—*Exhibiting the number of outbreaks of typhoid fever reported to have begun, and to have been present, in each month of the year 1903, in Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Outbreaks began.....	62	46	38	40	38	45	77	128	130	124	42	54	824
Outbreaks present.....	107	131	139	130	120	111	146	251	319	348	278	211	.....

 TABLE 4.—*Exhibiting the number and per cent of cases of typhoid fever taken sick, and the number and per cent present in Michigan in each month during the year 1903. Includes each case for which the time during which it existed, was stated in reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.*

	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number of cases taken sick.....	*2,613	125	174	148	109	104	110	153	324	525	454	221	166
Number of cases present in any part of the month.....	.....	186	273	331	259	210	198	245	461	714	830	583	402

\* Of the 2,840 cases of typhoid fever reported in 1903, the months in which they were taken sick were reported in only 2,613 instances.

 TABLE 5.—*Showing the number of deaths from typhoid fever and typhoid pneumonia in each month of the year 1903; and the per cent the deaths in each month were of all deaths from typhoid fever, and per cent the deaths in each month were of all deaths from typhoid pneumonia, the dates of which were reported to the office of the State Board of Health.*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Deaths from typhoid fever.....	44	32	55	35	38	22	26	49	77	97	86	52	613
Per cent.....	7.1	5.2	8.9	5.7	6.2	3.5	4.2	8.0	12.6	15.8	14.0	8.5	.....
Deaths from typhoid pneumonia.....	1	4	4	5	5	4	1	1	0	1	5	5	36
Per cent.....	3	11	11	14	14	11	3	3	0	3	14	14	.....

*Reported sources of contagium of typhoid fever.*—Of the 2,840 reported cases of typhoid fever in 1903, the local health officers stated the source of contagium as follows:

Traced to a former case, 122; attributed to infected, contaminated, or surface water, 71; cases reported as coming from outside jurisdiction, 191; from probable outside jurisdiction, 15; attributed to unsanitary conditions, 17; contaminated food or milk supply, 5 cases; the source of contagium of which was reported as unknown, 1,751 cases; the source of contagium of which was not reported, or the statements were too indefinite for classification, 608; from flies, 15; probably from drinking water, 45.



In 195 outbreaks, aggregating 532 cases, including 98 deaths, it was reported that the wells, the ordinary source of the drinking water, were within one hundred feet of privies.

In sixty-two households, typhoid fever was reported where the disease had previously existed on the same premises, the time between these cases, however, ranging from one month to thirty-seven years.

*Typhoid fever probably spread by flies.*—Of the fifteen outbreaks in which flies were mentioned as probable sources of contagium, by infecting the food, two instances are worthy of special mention, and emphasize the necessity and importance of protecting the interior of houses and other places where food is kept, against flies, especially in those localities where privies and cesspools exist. The health officer of a village reports: "Families in block that were 'dirty' and had flies had fever. All of the the 'Fly Families' in block had fever. None of the families that were clean and used screens had it." The health officer of a township reports: "The house swarmed with flies. No screens. The family had no conveniences, flies could infect everything."

*Bacteriological diagnosis of typhoid fever.*—In four outbreaks, the blood of the patients sick from typhoid fever was examined by the Widal test. None gave positive proofs of the typhoid bacillus, two were negative, one was reported as "fair," and one did not state whether or not the germ was found.

*Measures taken to restrict typhoid fever,—results.*—In studying the effects of efforts of health officers for the restriction and prevention of typhoid fever, and of the difficulties experienced by some of them in carrying out the methods recommended by the State Board of Health to that end, it is interesting to note the difference in the reported number of cases of sickness and of deaths from this disease, in outbreaks where local health officers were able to enforce isolation and disinfection, and in those outbreaks in which, for any reason, those restrictive measures were neglected.

By Table 6 it may be seen that in the outbreaks relative to which the reports state that isolation and disinfection were enforced, there occurred 1.56 cases, including .33 of one death per outbreak; whereas, in those outbreaks in which isolation and disinfection were neglected there were 2.61 cases, including .62 of one death per outbreak.

An examination of Table 6 shows that there were 295 outbreaks where isolation and disinfection were doubtful, and that the number of cases to the outbreak was greater than in those outbreaks where isolation and disinfection were enforced.

In the compilation of the reports for Tables 6 and 7 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and disinfection both neglected." If, on the other hand, as often occurs, quite a number of persons are exposed



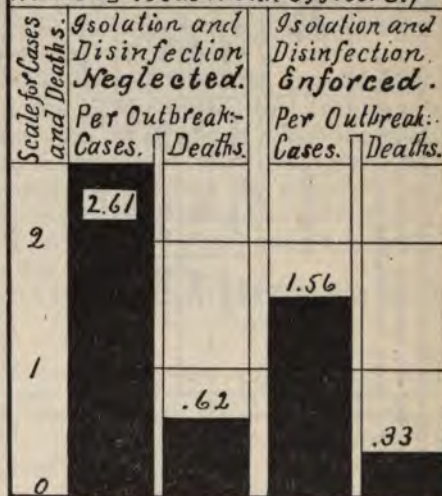
TABLE 6.—TYPHOID FEVER IN MICHIGAN IN 1903.—Exhibiting the numbers and average numbers of cases and deaths per outbreak—(1) in all the 897 outbreaks reported; (2) in the 295 outbreaks in which isolation was enforced; (3) in the 10 outbreaks in which disinfection was enforced and isolation doubtful; (4) in the 59 outbreaks in which isolation was enforced and disinfection was doubtful; (5) in the 101 outbreaks in which disinfection was enforced and isolation neglected; (6) in the 50 outbreaks in which isolation was enforced and disinfection neglected; (7) in the 178 outbreaks in which both isolation and disinfection were neglected; (8) in the 224 outbreaks in which both isolation and disinfection were enforced.

(1) All outbreaks. (897 outbreaks.)	(2) Isolation or disinfection or both not mentioned, or statements doubtful. (295 outbreaks.)	(3) Disinfection enforced— isolation doubtful. (10 outbreaks.)	(4) Isolation enforced— disinfection doubtful. (59 outbreaks.)	(5) Disinfection enforced— isolation neglected. (101 outbreaks.)	(6) Isolation enforced— disinfection neglected. (50 outbreaks.)	(7) Isolation and disinfection both neglected. (178 outbreaks.)	(8) Isolation and disinfection both enforced. (224 outbreaks.)
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
2,067	476	13	5	223	49	465	110
2.30	.53	1.30	.5	2.21	1.30	2.61	1.56
Totals.....	863	204	204	39	17	465	110
Averages.....	2.93	.69	1.76	.39	.57	2.61	.62

\* These do not include the cases and deaths in Detroit, Grand Rapids, Kalamazoo, Bay City, Traverse City and Calumet township, because of the difficulty in determining the beginning and ending of an outbreak in these localities, in which the disease was present in some part of the locality nearly all the time.  
The figures in the last four columns in the last line of Table 6 are graphically represented in the diagram on this same page.

# ISOLATION AND DISINFECTION. RESTRICT TYPHOID FEVER.

*Typhoid fever in Michigan in 1903—Exhibiting the average numbers of cases and deaths per outbreak: in all outbreaks in which Isolation and Disinfection were both Neglected; and in all outbreaks in which both were Enforced. (Compiled in the office of the Secretary of the State Board of Health, from reports made by Local Health Officers.)*



*This diagram graphically represents the lower line of figures in the last four columns of table 6.*

[PLATE 1228.]

TABLE 7.—TYPHOID FEVER IN MICHIGAN.—Exhibiting for the year 1903, and for the thirteen year period, 1890-1902, the numbers of reported outbreaks, cases and deaths in all outbreaks and the numbers of outbreaks, cases and deaths for the same year and period of years, relative to which restrictive measures were neglected, and the numbers relative to which those measures were enforced; also the estimated number of cases and deaths prevented, in said year and period of years, by isolation and disinfection.

Year.	All outbreaks.			Isolation and disinfection both neglected.			Isolation and disinfection both enforced.			Cases and deaths indicated as having been prevented by isolation and disinfection.		
	Out-breaks.	Cases.	Deaths.	Out-breaks.	Cases.	Deaths.	Out-breaks.	Cases.	Deaths.	Cases.	Deaths.	Deaths.
1903.....	* 897	2,067	476	178	465	110	224	350	73	274	80	
Totals 1890-1902.....	8,938	33,197	5,884	1,439	7,660	1,186	1,349	2,536	451	17,711	1,826	
Averages 13 years, 1890-1902.....	687	2,554	453	111	589	91	104	195	35	1,362	140	
Average cases and deaths per outbreak, 13 years, 1890-1902.....		3.72	.66		5.31	.82		1.88	.34			

\* See foot-note to Table 6.

TABLE 15.—Exhibiting the number of inches of earth above the ground water in Lansing, by months, for the year 1903, compared with the per cent of reported cases and outbreaks of typhoid fever in Michigan, for each month of 1903; also average per cents of the same for the ten years, 1893-1902, and the total number of cases and outbreaks included in this table. Compiled from those cases of which the date of occurrence was given; and for those outbreaks of which the time of beginning was stated.

Specifications relative to ground water and typhoid fever.														No. of cases and outbreaks included in this table.
Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.		
Inches of earth above the water, year 1903.....	297	306	302	297	292	293	295	296	*	293	294	303	2,701	
Per cent of cases of typhoid fever reported, year 1903.....	14	7	10	12	8	7	9	17	26	31	22	15	824	
Per cent of outbreaks which began in each month, 1903.....	9	8	6	5	5	5	9	16	16	15	5	7		
Inches of earth above the water, average 1893-1902.....	311	313	314	311	309	306	308	310	311	313	315	314	30,790	
Per cent of cases of typhoid fever reported, average 1893-1902.....	11	4	4	4	4	5	8	14	23	27	20	12	6,787	
Per cent of outbreaks which began in each month, average 1893-1902.....	9	6	4	4	4	6	9	17	20	15	8	5		

\* Owing to a temporary building erected over it, the well could not be measured.



at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and disinfection enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

For the year 1903, better effort has been made to restrict this disease, as is shown by the fact that in twenty-five per cent of the outbreaks isolation and disinfection were enforced, while for the period of twelve years, 1890-1902, in only fifteen per cent of the outbreaks were restrictive measures enforced.

Table 7 indicates that in 1903 there was a saving of 274 cases, including 80 lives, through isolation and disinfection.

In the thirteen years, 1890-1902, in those outbreaks in which isolation and disinfection were neglected, the average number of cases per outbreak was 5.31; and the average number of deaths .82 of one death; and in those outbreaks, in this period of years, in which restrictive measures were enforced, the average number of cases per outbreak was 1.88, and the average number of deaths per outbreak was .34 of one death.

*Duration and average duration of sickness from reported typhoid fever.*—Of the 2,101 males and 1,515 females who were reported to have died from typhoid fever within the sixteen years, 1887-1902, and of which the interval between the day of being taken sick and the day of death was given, 22 per cent of males and 24 per cent of females died before the eleventh day of sickness; 18 per cent of males and 22 per cent of females died after eleven to fifteen days of sickness. Seventy-three per cent of males and 74 per cent of females died before the twenty-sixth day of sickness.

The average duration of fatal cases of typhoid fever in 1903, was in males 19.8 days, and in females 19.3 days.

TABLE 8.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from typhoid fever in Michigan, during the year 1903, and averages for the 16 years, 1887-1902. Compiled from those reports which stated the length of time the patient was sick.*

Fatal cases of typhoid fever.														
Year.	Sex.	Average duration.	No. of cases included.	Duration of sickness:—Per cent of deaths in each period of days.										
				All cases.	Under 11 days.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.
1903.	Males.....	19.8	227	100	24	20	14	17	11	5	3	3	1	2
	Females....	19.3	174	100	26	21	21	14	7	2	2	2	0	3
Av. 1887-1902.	Males.....	.....	131	100	22	18	17	16	11	6	5	3	3	4
	Females....	.....	95	100	24	22	16	12	10	6	4	4	1	3



In Table 9 it may be noticed that in *non-fatal* cases of typhoid fever, for the sixteen years, 1887-1902, sixty-three per cent of the males and sixty-four per cent of the females recovered before the thirty-sixth day of sickness. The average duration of non-fatal cases in 1903 was 31.3 days for males, and 32.1 days for females.

TABLE 9.—*Exhibiting, by sex of patient, by per cent of cases which recovered in specified periods of time, the duration (in days) of non-fatal cases of sickness from typhoid fever, in Michigan, during the year 1903, and the averages for the 16 years, 1887-1902. Compiled from those reports which stated the length of time the patient was sick.*

Non-fatal cases of typhoid fever.													
Year.	Sex.	Average duration.	No. of cases included.	Duration of sickness:—Per cent of cases in each period of days.									
				All periods.	Under 11 days.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.
												51 to 55.	56 days and over.
1903.	Males.....	31.3	826	100	3	5	10	14	26	14	9	8	4
	Females.....	32.1	603	100	2	4	10	12	28	13	9	6	4
Av. 1887-1902.	Males.....		478	100	2	6	9	15	18	13	11	8	5
	Females.....		362	100	2	6	9	16	17	14	11	7	4

*Ages of fatal and non-fatal cases of reported typhoid fever.*—Table 10 shows that of the 1,310 males and 966 females who were sick with typhoid fever in 1903, and of whom the ages were reported, the greatest per cent of males were of ages between twenty and twenty-four years; and of females (in any five year period) was between fifteen and nineteen years.

Table 11 shows that of the 354 males and 282 females who died of typhoid fever in 1903, and of whom the ages were reported, the greatest per cent of males were aged from twenty to twenty-four years and fifty years and over; and the greatest per cent of females were fifty years and over; and that 57 per cent of the males and 64 per cent of the females were under thirty years of age.

Table 11 shows also that the greatest per cent of decedents of both sexes in the eleven years, 1892-1902, died at ages between twenty and twenty-four years.

In studying Tables 10 and 11, and first two lines in Table 12, relative to age of persons who died with or who had typhoid fever, it should be held in mind that there are more persons living in the earlier ages than at the more advanced ages. In the last three lines of Table 12, this fact is taken account of, and they exhibit the relative danger of death at each period of life, according to the experience in Michigan in the eleven years, 1892-1902.

*The average age of fatal and non-fatal cases of reported typhoid fever.*—The average age of decedents for the year 1903 was 31.1 years for males and 27.9 years for females, and for the period of years 1892-1902, was 28.0 for males and 26.6 for females, and for both sexes 27.4 years. The average age of cases sick from this disease, for the year 1903, was 24.4 years for males and 23.4 years for females; and for the period of years 1887-1902, the average age was 23 years for males and 22 years for females.

TABLE 10.—*Exhibiting, by sex, the per cent of persons in certain age-groups sick from typhoid fever in Michigan, during the year 1903, and the average for the 16 years, 1887-1902; also the average age and the number of cases included. Compiled from such reports as stated the ages.*

Year.	Sex.	Average age of persons sick, years.	No. of cases included.	Age.—In periods of years.—Per cent of cases in each period of age.										
				All ages.	Under 10 years.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1903.	Males.....	24.4	1,310	100	12	11	15	18	12	10	6	4	4	7
	Females.....	23.4	966	100	17	16	19	15	7	5	4	5	3	8
Av. 1887-1902.	Males.....	23	880	100	23	17	24	29	28	14	10	6	5	8
	Females.....	22	667	100	25	23	28	21	14	10	8	6	4	10

TABLE 11.—*Exhibiting, by sex, the per cent of persons in certain age-groups who died from typhoid fever, in Michigan in 1903, and during the 11 years, 1892-1902, also the average age and the number of deaths included. Compiled from such reports as stated the ages.*

Year.	Sex.	Average age of decedents, years.	Number of deaths included.	Per cent in certain age-groups.*										
				All ages.	Under 10 years.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1903.	Males.....	31.1	354	100	8	6	12	16	15	8	7	5	6	16
	Females.....	27.9	282	100	16	11	17	11	9	4	4	6	4	18
1892-1902.	Males.....	28.0	2,735	100	8	8	13	19	15	11	8	5	5	10
	Females.....	26.6	1,916	100	11	13	18	15	9	7	7	5	4	12
	Both sexes.....	27.4	4,651	100	10	10	15	17	13	9	7	5	4	10

\* In each age-group both years are included.

By Table 12 it may be seen, that of males the greatest death-rates from typhoid fever were in the age-periods fifteen to thirty-five years, especially in the period twenty to twenty-four years; the greatest death-rate of females was during the age-period fifteen to twenty-five years.

*Two lines of evidence of the prevalence of typhoid fever.*—In studying the prevalence of typhoid fever in 1903, from the facts presented in the preceding and following pages, it must be borne in mind that those facts are derived from two distinct sources of information.

1.—The numbers of outbreaks, of cases of sickness, and of deaths from typhoid fever are taken from special reports from health officers, during the course of an outbreak, at its close, or in annual reports at the close of the year. If all the people and officers reported as the law provides, the facts presented would represent the *actual numbers* of outbreaks, cases of sickness, and deaths from typhoid fever which occurred in the State during the year



but *all* do not so report. It is just, however, to state that as the people generally are becoming better instructed in the measures recommended by the State Board of Health for the saving of life and health, better and more complete reports are made year by year. So, each year, we believe that an increasing proportion of the cases of sickness and deaths from the dangerous communicable diseases are reported to this office. This tends toward an apparent increase in the prevalence of the disease each year, modified, of course, by the real fluctuation in prevalence. While waiting for perfect reports, the facts derived from those now received are valuable for purposes of study.

TABLE 12.—*Exhibiting, by sex, the number of persons in certain age-groups who died of typhoid fever during the year 1903; also by age-groups, the number of deaths in the 11 years, 1892-1902, per 100,000 inhabitants.*

Year.	Sex.	Average age of decedents, years.	No. of deaths included.	Number of deaths in certain age-groups.*									
				Under 10 years.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1903.	Males.....	31.1	354	27	20	43	58	53	27	26	19	23	58
	Females.....	27.9	282	44	31	49	32	24	11	12	18	11	50
1892-1902.	Males.....	{ Deaths per 100,000 in- habitants of the same sex and age in each age-group..... }											
	Females.....												
1892-1902.	{ The average number of deaths (both sexes) per 100,000 inhabitants in each age- group for the eleven years, 1892-1902.. }			7.7	17.5	28.5	33.3	27.4	22.3	19.6	14.9	16.6	12.7

\* In each age-group both years are included.

TABLE 13.—*For the year 1903, and an average for the 10 years, 1893-1902, the per cent of reports (from regular correspondents to the State Board of Health, and others) stating the presence of typhoid fever in Michigan; also, for the same year and period of years, the average number of outbreaks, number of localities of outbreaks, the cases of sickness and the deaths reported from typhoid fever.*

Years.	Per cent of weekly postal reports stating the presence of typhoid fever.	Reported outbreaks of typhoid fever.	Reported localities of outbreaks of typhoid fever.	Reported cases of sickness from typhoid fever.	Reported deaths from typhoid fever.
1903.....	15	929	702	2,840	640
Average 10 years, 1893-1902.....	11	779	633	3,112	594

2.—The prevalence of typhoid fever, or any given disease, as indicated by the "per cent of reports" is taken from the weekly postal-card reports from regular correspondents of the State Board, health officers of cities and villages, and others. The "per cent of reports" is the per cent of the whole number of reports received which stated the presence of the disease named; it gives

the relative prevalence of the disease, under the observation of the physicians who report. It may represent the relative area of prevalence of the disease, combined with the relative number of weeks the disease continued where it did occur, *but not the number of cases.*

The weekly card-reports, however, furnish a valuable means of ascertaining, approximately, the relative prevalence of the several diseases in a given year, and the relative prevalence of a given disease in one year compared with other years, and it is as good a scheme for ascertaining the facts as is yet available. Therefore the sickness statistics based upon those weekly card-reports should be relied upon for a comparison of the relative prevalence of typhoid fever in 1903, compared with preceding years. However, the evidence from the two sources may well be compared.

A comparison of the evidence from the two sources just mentioned, relative to typhoid fever during the years 1893-1902, is facilitated by Table 13.

Table 14 shows the depth of ground above water in wells, by months for the year 1903, and the average for the years 1878, 1880-1888, also the average of ground water by months during the ten years, 1892-1899, 1901, 1902, at all stations in Michigan where water in a well was measured.

TABLE 14.—HEIGHT OF GROUND WATER.—*Inches of earth above the water, by months for the year 1903; also averages for the 10 years, 1878, 1880-1888,\* and for 10 years, 1892-1899, 1901, 1902, at stations in Michigan.*

Period of time.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 10 years, 1878, 1880-1888*.....	187	184	179	175	167	167	171	189	195	202	209	202	198
Av. 10 years, 1892-1899, 1901, 1902.....	272	280	273	265	256	267	271	277	273	279	274	277	272
Av. in year 1903.....	306	302	298	287	291	293	300	302	305	310	305	337	343

\* The stations at which the observations were made were different for each year in this period, but this average is useful for comparing the *months* in this period with each other, and, perhaps, for comparing one series of years with another, if allowance is made for the average difference between the periods. The names of these stations previous to the year 1884 are stated on page 106, Report Michigan State Board of Health, 1884. The names of stations for the years 1884-1903, are stated in the articles on "Meteorological Conditions in Michigan," in subsequent reports.

TABLE 16.\*—TYPHOID FEVER IN MICHIGAN.—*Average per cent of weekly card-reports stating the presence of typhoid fever, by months, for 10 years, 1878-1887, and in the year 1903; also the average for the 10 years 1893-1902.*

Period of time.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 10 years, 1878-87.....	10	6	5	4	3	3	5	7	14	18	21	16	10
1903.....	13	11	7	8	10	6	6	9	17	21	21	18	15
Av. 10 years, 1893-1902....	11	8	6	5	5	4	5	8	15	20	22	18	12

\* TABLE No. 15 is on page 142.



TABLE 17.—*Sickness from typhoid fever in Michigan (as indicated by the weekly card-reports by all observers) and the depth of earth (in inches) above the water in the well, and the temperature of the water in the well at Lansing, Michigan, averages by year and months for the 10 years, 1893-1902.*

	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Sickness from typhoid fever*.....	11	8	6	5	5	4	5	8	15	20	22	18	12
Inches of earth above water in well.....	311	313	314	311	310	309	306	308	310	311	313	315	314
Temperature of water in well.....	51	§51	†49	48	**49	**50	**50	**51	**51	**52	‡52	‡52	§51

TABLE 18.—*RAINFALL IN MICHIGAN.—Average number of inches, by months, for the 10 years, 1878-1887, and the year 1903; also the average for the 10 years, 1893-1902.*

Period of time.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 10 years, 1878-1887....	37.27	2.09	2.89	2.28	2.49	3.52	4.24	3.44	3.21	3.72	3.45	2.98	2.69
1903.....	35.73	1.61	2.56	2.11	3.07	2.89	3.55	4.71	4.93	3.46	2.16	2.37	2.33
Av. 10 years, 1893-1902....	31.12	2.10	1.67	2.33	2.24	3.44	3.02	3.28	1.36	2.96	2.78	2.65	2.33

TABLE 19.—*TEMPERATURE OF THE WATER in the well at the State Capitol in Lansing, Mich., by months for the year 1903; also the average for the 10 years, 1893-1902.*

Year and period of years.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.....	51	51	50	50	49	50	50	50	51	52	53	52	51
Av. 10 years, 1893-1902....	51	§51	†49	48	**49	**50	**50	**51	**51	**52	‡52	‡52	§51

\* Per cent of weekly card reports which stated the presence of typhoid fever.

† Average for six years.

‡ Average for seven years.

§ Average for eight years.

\*\* Average for nine years.



TABLE 20.—*Exhibiting the average total annual rainfall at stations in Michigan, the same for Lansing, the inches of earth above the ground water at Lansing, the inches of water in an undisturbed well at Lansing, and the reported sickness, from typhoid fever in Michigan, as indicated by the per cent of all the weekly card-reports, which stated the presence of typhoid fever, during the year 1903, and averages for the 10 years, 1893-1092.*

Year and period of years.	Average total annual rainfall at stations in Michigan, in inches.	Total annual rainfall at Lansing, in inches.	Inches of earth above the ground water at Lansing.	Inches of water in an unused well at Lansing.	Ground water higher (+) or lower (—) than the 10 years average, in inches.	Average per cent of all weekly card-reports stating the presence of typhoid fever.	More (+) or less (—) sickness from typhoid fever than the 10 years average.
1903.....	35.73	36.68	297	27	—14	13	+2
Av. 10 yrs., 1893-1902....	31.12	32.27	311	13	.....	11	.....

#### DIPHTHERIA AND CROUP IN MICHIGAN.—YEAR ENDING DECEMBER 31, 1903.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE STATE BOARD OF HEALTH.

During the year ending December 31, 1903, there were reported to the Secretary of the State Board of Health, 542 outbreaks of diphtheria in 417 localities in Michigan, which resulted in 3,670 cases, including 569 deaths.

Throughout this article fatal cases of croup are included. For public health purposes, sanitarians now consider fatal croup to be diphtheria of the larynx.

The average numbers of cases of sickness and deaths per outbreak were, cases, 6.8; deaths, 1.1. The fatality, i. e., the per cent of cases which proved fatal, was 15.5 deaths per 100 cases (Table 2).

*Antitoxin treatment of diphtheria.*—In the reports relating to diphtheria in Michigan during the year 1903, effort has been made to collect information relating to the use of diphtheria antitoxin. From reports made by health officers in different localities, it is evident that beneficial results have been attained through its use. In outbreaks where that agent has been made use of in the early stages of the disease, and properly administered, not only has the number of cases and deaths been diminished, but often a subsequent development of the disease has proved to be of a very mild type, which indicates to some extent the efficiency of antitoxin as an immunizing, as well as a curative agent.

The curative effect of antitoxin is shown in the summary, Table 1, where it may be seen that antitoxin was used in twenty-eight more outbreaks and on one hundred thirteen more sick persons than in 1902. The fatality in those outbreaks in which antitoxin was used was considerably less than the fatality in those outbreaks in which it was not used, and also considerably

less than the average fatality from diphtheria for the whole State, for each of the years, 1900-1903. In the case of those who died of diphtheria after the use of antitoxin, it was reported that in a number of cases the serum had been administered too late, and in one instance that the quantity given was insufficient.

TABLE 1.—*Summary of data relative to the use of diphtheria antitoxin in Michigan in the four years, 1900-1903.*

	Outbreaks.	Cases, sick.	Deaths.	Fatality-rate,—deaths per 100 cases.
All outbreaks of diphtheria.....	{ 1900—493 1901—525 1902—494 1903—542	{ 2,706 2,498 2,993 3,670	{ 528 493 500 569	{ 19.5 19.7 *16.4 15.5
Outbreaks in which antitoxin was used.....	{ 1900—135 1901—184 1902—213 1903—241	{ † 535 † 589 † 801 † 914	{ 81 90 109 108	{ 15.1 15.3 13.6 11.8
Outbreaks in which antitoxin was not used.....	{ 1900—358 1901—341 1902—281 1903—301	{ 2,171 1,909 2,192 2,756	{ 477 403 391 461	{ 20.6 21.1 17.8 16.1

\* Exclusive of the deaths in the cities of Muskegon and Sault Ste. Marie, from which cities only fatal cases of diphtheria were reported.

† These figures represent the numbers of sick persons treated with antitoxin.

The efficiency of antitoxin as an immunizing agent may be seen by the following: In 1903, in addition to 914 sick persons treated with antitoxin, there were 585 persons who were more or less exposed to the contagium of diphtheria, on whom antitoxin was used, and of this number only twelve persons were reported to have afterwards taken the disease, and in all but one case the disease was reported to have been in a mild form. In one household where there were four cases of diphtheria, two exposed persons who had been treated with antitoxin did not contract the disease. In another instance, the health officer reported that of twenty-five persons exposed, and who had been treated with antitoxin, not a single case occurred, "although in close touch with the patient."

The decrease in fatality for a period of years since the use of antitoxin, which began in 1894, also the decrease in the numbers of cases and deaths per outbreak, is shown in Table 2.

*Sickness-rates from reported diphtheria in 1903.*—Table 3 shows that the sickness-rate for the whole State for the year was 146.2 per 100,000 of population. By counties, the greatest sickness-rate (581.3) was in Gogebic county; and the lowest, where sickness was reported (3.3), was in Gratiot county. From seven counties no sickness from diphtheria was reported.

*Death-rates from reported diphtheria in 1903.*—The death-rate for the State was 22.7 per 100,000 of population. The highest death-rate (77.5) was in Gogebic county; and the lowest, where deaths occurred (2.5) of one death per 100,000 of population, was in Ottawa county. Tuscola and Muskegon counties, each with a rate of 2.7 and Ionia county, with a rate of 2.9, were nearly as low. In fourteen counties from which sickness from diphtheria was reported there were no reported deaths from this disease.



TABLE 2.—*Exhibiting for the 10 years, 1884-1893, the numbers of reported outbreaks, localities, cases and deaths; average numbers of cases and deaths per outbreak, and the per cent of cases which proved fatal (fatality rate), before the use of antitoxin. Also a similar average for 10 years, 1894-1903, since the beginning of the use of antitoxin.*

Year.	Reported outbreaks.	Reported localities.	Reported cases.	Average cases per outbreak.	Reported deaths.	Average deaths per outbreak.	Deaths per 100 cases.
1884.....	362	302	3,915	10.8	905	2.5	23.0
1885.....	467	396	4,018	8.6	964	2.0	24.0
1886.....	550	422	4,244	7.7	982	1.8	23.0
1887.....	466	371	3,382	7.3	825	1.8	24.4
1888.....	337	283	2,228	6.6	532	1.6	23.9
1889.....	398	329	3,157	7.9	683	1.7	21.6
1890.....	442	365	4,206	9.5	1,050	2.4	25.0
1891.....	535	461	4,385	8.2	1,002	1.9	22.8
1892.....	527	463	4,818	9.1	1,099	2.1	22.8
1893.....	546	460	4,736	8.7	1,092	2.0	23.1
Average for 10 years, 1884-1893.....	463	385	3,909	8.4	913	2.0	23.4
1894*.....	435	367	3,852	8.9	744	1.7	*19.3
1895.....	401	347	3,433	8.6	708	1.8	20.6
1896.....	423	331	4,013	9.5	757	1.8	18.9
1897.....	495	396	4,132	8.3	756	1.5	18.3
1898.....	439	354	2,357	5.4	477	1.1	20.2
1899.....	366	303	2,154	5.9	435	1.2	20.2
1900.....	493	399	2,706	5.5	528	1.1	19.5
1901.....	525	412	2,498	4.8	493	.9	19.7
1902.....	494	380	2,993	6.1	500	1.0	†16.4
1903.....	542	417	3,670	6.8	569	1.0	15.5
Average for 10 years, 1894-1903.....	461	371	3,181	6.9	597	1.3	18.8
Departure of average for 10 years, 1894-1903, from average for 10 years, 1884-1893.....	-2	-14	-728	-1.5	-316	-.7	-4.6

\* The use of antitoxin for diphtheria was commenced about this time.

† Exclusive of the cases in the cities of Muskegon and Sault Ste. Marie, from which cities only the fatal cases were reported.

*The proportionate case-rate, death-rate, and fatality or case mortality, from reported diphtheria, in cities and in the rural districts.*—From the data in Table 4 it may be seen that 76 per cent of the cities, and 23 per cent of the rural districts in the State were infected with diphtheria in 1903, but the average population of the cities is nearly one hundred twenty-four times the average of the rural districts. The highest case-rate (232.9 per 100,000 inhabitants) and death rate (35.5) occurred in the cities, the case-rate being sixty-one per cent and the death-rate fifty-nine per cent greater in the cities than in the rural districts. The fatality, however, was slightly lower in the cities than in the rural districts.

*Diphtheria in each month of the year 1903.*—The last line in Table 5 shows the number of outbreaks present in each month of the year. As many of the outbreaks lasted more than one month they are counted in each month of their duration; consequently the sum of the outbreaks present in the several months exceeds the total number of reported outbreaks.



TABLE 3.—*Number of cases and deaths reported from diphtheria per 100,000 persons living in each county in Michigan during the year 1903. Compiled from reports of health officers, clerks, etc.*

State and counties.	Estimated population for 1903.*	Number of reported		Number per 100,000 population, of		Counties.	Estimated population for 1903.*	Number of reported		Number per 100,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,510,652	3,670	569	146.6	22.7	Keweenaw.....	3,421	0	0	0	0
Alcona.....	5,826	0	0	0	0	Lake.....	4,487	1	0	22.3	0
Alger.....	8,103	8	2	98.7	24.7	Lapeer.....	27,024	34	1	125.8	3.7
Allegan.....	38,624	11	5	28.5	12.9	Leelanau.....	11,045	1	0	9.1	0
Alpena.....	18,521	24	4	129.6	21.6	Lenawee.....	48,338	13	3	26.9	6.2
Antrim.....	18,632	7	0	37.6	0	Livingston.....	19,278	0	0	0	0
Arenac.....	11,258	4	1	35.5	8.9	Luce.....	3,298	0	0	0	0
Baraga.....	4,365	4	1	91.6	22.9	Mackinac.....	7,934	0	0	0	0
Barry.....	21,921	16	2	73.0	9.1	Macomb.....	33,670	42	8	124.7	23.8
Bay.....	62,912	153	20	243.2	31.8	Manistee.....	28,723	18	4	62.7	13.9
Benzie.....	10,489	29	3	276.5	28.6	Marquette.....	42,850	218	27	508.8	63.0
Berrien.....	50,926	46	9	90.3	17.7	Mason.....	19,113	3	0	15.7	0
Branch.....	28,609	20	8	69.9	28.0	Mecosta.....	20,675	6	1	29.0	4.8
Calhoun.....	50,233	81	15	161.2	29.9	Menominee.....	27,593	17	6	61.6	21.7
Cass.....	20,726	44	4	212.3	19.3	Midland.....	15,048	19	3	126.3	19.9
Charlevoix.....	15,099	8	2	53.0	13.2	Missaukee.....	10,478	2	0	19.1	0
Cheboygan.....	16,413	18	5	109.7	30.5	Monroe.....	32,542	59	10	181.3	30.7
Chippewa.....	24,338	4	3	16.4	12.3	Montcalm.....	32,053	18	10	56.2	31.2
Clare.....	8,549	4	1	46.8	11.7	Montmorency.....	3,630	9	0	247.9	0
Clinton.....	24,573	6	1	24.4	4.1	Muskegon.....	36,932	16	1	43.3	2.7
Crawford.....	3,057	5	0	163.6	0	Newaygo.....	16,948	8	0	47.2	0
Delta.....	26,185	92	13	351.3	49.6	Oakland.....	45,848	42	14	91.6	30.5
Dickinson.....	19,463	19	1	97.6	5.1	Oceana.....	17,665	2	1	11.3	5.7
Eaton.....	31,195	15	2	48.1	6.4	Ogemaw.....	8,827	7	1	79.3	11.3
Emmet.....	18,700	5	0	26.7	0	Ontonagon.....	5,859	27	2	460.8	34.1
Genesee.....	42,428	50	11	117.8	25.9	Osceola.....	18,549	1	0	5.4	0
Gladwin.....	7,392	7	1	94.7	13.5	Oscoda.....	1,300	0	0	0	0
Gogebic.....	18,064	105	14	581.3	77.5	Otsego.....	6,862	3	2	43.7	29.1
Grand Traverse...	21,958	9	2	41.0	9.1	Ottawa.....	39,955	41	1	102.6	2.5
Gratiot.....	30,444	1	0	3.3	0	Presque Isle.....	10,270	2	1	19.5	9.7
Hillsdale.....	29,662	11	1	37.1	3.4	Rosecommon.....	1,850	1	0	54.1	0
Houghton.....	76,998	98	14	127.3	18.2	Saginaw.....	80,911	83	7	102.6	8.7
Huron.....	35,113	69	10	196.5	28.5	Sanilac.....	35,607	10	3	28.1	8.4
Ingham.....	39,881	46	10	115.3	25.1	Schoolcraft.....	8,267	1	0	12.1	0
Ionia.....	34,084	4	1	11.7	2.9	Shiawassee.....	34,370	44	7	128.0	20.4
Iosco.....	9,201	1	0	108.7	0	St. Clair.....	55,678	73	6	131.1	10.8
Iron.....	10,835	0	0	0	0	St. Joseph.....	23,290	11	3	47.2	12.9
Isabella.....	23,453	3	3	59.7	12.8	Tuscola.....	36,625	28	1	76.4	2.7
Jackson.....	49,062	14	3	28.5	6.1	Van Buren.....	34,375	22	4	64.0	11.6
Kalamazoo.....	45,435	47	3	103.4	6.6	Washtenaw.....	49,885	25	4	50.1	8.0
Kalkaska.....	7,877	41	3	520.5	38.1	Wayne.....	376,951	1,501	249	398.2	66.0
Kent.....	133,596	77	6	57.6	4.5	Wexford.....	18,240	45	5	246.7	27.4

\* Population estimated by average annual increase (arithmetical method), based on the State Census of 1894 and the U. S. Census of 1900.

TABLE 4.—*Exhibiting the numbers of outbreaks, and cases of and deaths from diphtheria which occurred in the cities, and in the rural districts of Michigan in 1903, and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in such localities. Compiled from reports of local health officials to the Secretary of the State Board of Health.*

Classes of political divisions and numbers of each class of divisions.	Estimated population.*	Health jurisdictions.	Outbreaks in—			Cases.	Deaths.	Fatality. (Per cent deaths of cases.)	Rates per 100,000 population.				
			Infected localities.		No. of				Cases.	Deaths.	Fatality. (Per cent deaths of cases.)	Cases.	Deaths.
			No. of	Per cent of all localities.									
State.....	2,510,652	1,607	417	25.9	542	3,670	569	15.5	146.2	22.7			
Cities.....	986,316	80	61	76.3	100	2,297	350	15.2	232.9	35.5			
Villages and townships.....	1,524,336	1,527	356	23.3	442	1,373	219	16.0	90.1	14.4			

\* Population estimated by average annual increase (arithmetical method), based on the State Census of 1904 and the U. S. Census of 1900.

TABLE 5.—*Exhibiting the number of outbreaks of diphtheria which were reported to have begun, and the number which were present, in each month of the year 1903, in the different local jurisdictions of Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Outbreaks began.....	62	38	34	26	30	35	20	35	37	58	51	54	480
Outbreaks present.....	101	96	87	80	78	84	69	72	85	113	126	128	.....

TABLE 6.—*Exhibiting the number of localities from which the presence of diphtheria was reported, the number of cases of diphtheria present and the number of cases taken sick, in Michigan in each month during the year 1903. Includes each case for which, the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.*

	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number of localities.....	*430	114	96	87	80	77	82	69	72	84	111	125	127
Number of cases taken sick. †3,500		360	215	212	177	203	229	170	205	239	477	511	502
Number of cases present.....		374	311	270	236	272	298	259	269	304	560	668	683

\* In addition to the 417 localities infected by outbreaks beginning in 1903, there were thirteen localities infected in January, 1903, by outbreaks continuing from 1902.

† Of the 3,670 cases of diphtheria reported in 1903, the months in which they were taken sick were reported in 3,500 instances.

Table 6 shows the influence of seasonal changes upon the prevalence of diphtheria. While present in the State during the entire year, a marked increase in the number of reported cases of this disease is noticeable during the month of October, this increase continuing through November and December. The disease was least prevalent in April, and the month in which the fewest cases were taken sick was July. In the warm months there was considerably less diphtheria than in the cold months. The greatest prevalence



of the disease was in October, November and December, following the opening of the public schools in September. But the increase of the disease begins before the schools open, showing the influence of the low temperature in increasing the disease.

Table 7 indicates that diphtheria of the pharynx (ordinary diphtheria) is not so dependent upon cold atmosphere as is diphtheria of the larynx (croup).

TABLE 7.—*The number of deaths from diphtheria and croup\* in each month of the year 1903; and the per cent the deaths from each of the specified causes, in each month, were of all the deaths from that disease, the dates of which were reported to the office of the State Board Health.*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Deaths from diphtheria...	53	38	28	30	45	39	36	37	37	64	91	77	575
Per cent.....	9.2	6.6	4.9	5.2	7.8	6.8	6.3	6.4	6.4	11.1	15.8	13.4	.....
Deaths from croup*.....	14	16	10	13	4	13	2	1	8	18	27	26	152
Per cent.....	9.2	10.5	6.6	8.6	2.6	8.6	1.3	.7	5.3	11.8	17.8	17.1	.....

\* Includes membranous croup.

*Source of contagium of diphtheria, and how the disease is spread.*—Of the 3,670 cases of diphtheria reported in 1903, the local health officers reported that 570 cases were traced to a former case; 98 cases to outside jurisdictions; 12 cases to unsanitary conditions; 4 cases to infected houses or rooms; and 1 case to infected clothing. Of the sources of the remaining cases, no definite statement, or no statement whatever, was made.

*Cases of diphtheria traced to preceding cases of the disease.*—As shown above, 570 of the 3,670 reported cases of diphtheria in Michigan in 1903, were traced to preceding cases of the disease. Had all first cases in the various jurisdictions been properly isolated, no doubt a large part of these 570 cases would have been prevented.

*Estimated number of cases of diphtheria prevented and lives saved by isolation and disinfection.*—Tables 8 and 9 and diagram [Plate No. 1230] compare the average number of cases and deaths in outbreaks of diphtheria where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where these measures were neglected\*. By Table 8 it may be seen that during the seventeen years, 1887-1903, there were nearly five times as many cases and deaths per outbreak in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced.

\* In the compilation of the reports for Tables 8 and 9 and the diagram showing the results obtained by isolation and disinfection every effort has been made to place the number of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate and disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and disinfection both neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and disinfection enforced." If, however, he neglects to properly isolate and disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."



TABLE 8.—DIPHTHERIA IN MICHIGAN, 1887-1903.—Exhibiting for each of the 17 years 1887-1903, the numbers of reported outbreaks, cases and deaths; also for this 17 year period, the average number of cases and deaths per outbreak in all outbreaks; in those outbreaks in which isolation or disinfection was doubtful; in which both isolation and disinfection were neglected; in which both isolation and disinfection were enforced; and also the numbers of cases and deaths indicated to have been prevented by isolation and disinfection.

Years.	All outbreaks.*			Isolation and disinfection, or both, not mentioned, or statements doubtful.			Isolation and disinfection both neglected.			Isolation and disinfection both enforced.			Indicated saving of cases and lives by isolation and disinfection.	
	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Cases.	Deaths.
1887.....	398	2,321	561	202	732	190	60	822	195	78	108	51	13,132	1733
1888.....	311	1,529	324	199	810	189	34	527	81	58	101	31	3,202	416
1889.....	376	1,956	418	254	1,314	280	41	478	108	63	98	14	2,398	570
1890.....	439	2,713	619	291	1,649	401	71	902	169	46	70	15	2,862	426
1891.....	532	2,985	643	366	1,777	389	79	944	194	70	157	33	3,392	666
1892.....	525	3,485	740	323	2,341	456	52	657	147	49	105	24	3,146	746
1893.....	536	3,133	746	303	1,681	362	74	1,020	282	65	159	45	4,253	1,296
1894.....	420	2,292	404	202	986	174	56	738	122	81	176	37	3,274	512
1895.....	388	2,292	425	178	1,102	209	45	610	119	70	146	28	2,969	599
1896.....	405	2,400	432	153	925	165	64	794	142	69	164	27	2,566	467
1897.....	464	2,838	497	165	916	137	100	1,366	252	93	225	46	3,500	672
1898.....	399	1,535	308	127	516	114	79	539	103	77	149	28	1,186	211
1899.....	348	1,116	248	106	391	92	68	272	73	91	213	34	276	124
1900.....	400	1,505	343	148	571	150	92	446	85	99	169	30	636	80
1901.....	502	2,020	391	165	590	138	88	781	132	127	254	49	2,438	362
1902.....	464	1,609	290	137	516	93	89	465	90	122	255	39	813	179
1903.....	498	1,773	301	136	598	118	85	522	86	142	347	47	1,285	202
Totals for the 17 years, 1887-1903.....	7,405	37,632	7,690	3,455	17,424	3,657	1,177	11,883	2,380	1,400	2,986	578	141,418	18,261
Average for the 17 years, 1887-1903.....	439	2,214	452	203	1,025	215	69	699	140	82	176	34	2,438	486
Average cases and deaths per outbreak for the 17 years, 1887-1903.....	.....	5.04	1.03	.....	5.05	1.06	.....	10.13	2.03	.....	2.15	.41	.....	.....

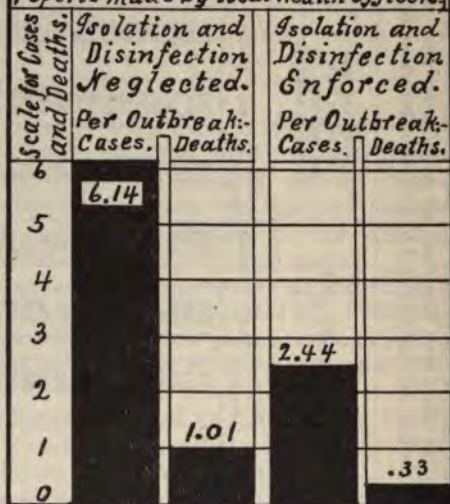
\* These do not include the cases and deaths in a number of the larger cities (foot-note to Table 9), because of the difficulty in determining the beginning and ending of an outbreak in these cities in which the disease was present in some part of the city nearly all the year. † The numbers of cases and deaths in this double column are found by multiplying "All outbreaks" for each year by the average number of cases, or deaths, per outbreak in those outbreaks in which "Isolation and disinfection both neglected," for that year, and deducting from the result thus obtained, the cases or deaths, as the case may be, which were reported to have occurred that year. ‡ The two sets of numbers appearing in this column are based on two distinct methods of solution, which are explained as follows: (1) the 41,418 cases and 5,261 deaths are totals of the columns representing cases and deaths in outbreaks in which isolation and disinfection were neglected; (2) the 18,261 cases and 7,454 deaths are obtained by multiplying the average numbers of cases and deaths per outbreak for the seventeen years, 1887-1903 (10.13 and 2.03 where isolation and disinfection were neglected), by the total number of outbreaks to find the numbers which would have occurred if all outbreaks had been neglected and subtracting therefrom the numbers of cases and deaths that were reported as having occurred during the seventeen year period.

TABLE 9.—DIPHTHERIA IN MICHIGAN IN 1903.—Exhibiting the average number of cases and deaths per outbreak—(1) in all the 498 outbreaks reported; (2) in the 136 outbreaks in which it is doubtful whether or not disinfection or isolation was enforced; (3) in the 16 outbreaks in which disinfection was enforced and isolation doubtful; (4) in the 46 outbreaks in which isolation was enforced and disinfection was doubtful; (5) in the 32 outbreaks in which disinfection was enforced and isolation neglected; (6) in the 41 outbreaks in which isolation was enforced and disinfection neglected; (7) in the 85 outbreaks in which isolation and disinfection were both neglected; (8) in the 142 outbreaks in which isolation and disinfection were both enforced.

	(1) All outbreaks. (498 outbreaks.)		(2) Isolation or disinfection or both not mentioned or statements doubtful. (136 outbreaks.)		(3) Disinfection enforced— isolation doubtful. (16 outbreaks.)		(4) Isolation enforced— disinfection doubtful. (46 outbreaks.)		(5) Disinfection enforced— isolation neglected. (32 outbreaks.)		(6) Isolation enforced— disinfection neglected. (41 outbreaks.)		(7) Isolation and disinfection both neglected. (85 outbreaks.)		(8) Isolation and disinfection both enforced. (142 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals.....	1,773	301	598	118	45	5	94	16	71	20	96	9	522	86	347	47
Averages.....	3.56	.60	4.40	.87	2.81	.31	2.04	.35	2.22	.63	2.34	.22	6.14	1.01	2.44	.33

### ISOLATION AND DISINFECTION RESTRICT DIPHTHERIA.

*Diphtheria in Michigan in 1903.—Exhibiting the average numbers of Cases and Deaths per outbreak:—in all outbreaks in which Isolation and Disinfection were both Neglected; and in all outbreaks in which both were Enforced. (Compiled in the office of the Secretary of the State Board of Health, from reports made by local Health Officers.)*



*This diagram graphically represents the lower line of figures in the last four columns of Table 9.*

[PLATE 1230.]



By Tables 8 and 9 it may be seen that during the year 1903 there were reported to the office of the State Board of Health 498 outbreaks of diphtheria, with 1,773 cases, including 301 deaths. Had no efforts at restriction been made, and had the average number of cases and deaths per outbreak remained the same as in the column headed "Isolation and disinfection both neglected," there would have occurred 3,058 cases, including 503 deaths, and taking from these respectively the cases (1,773), including deaths (301), which did occur, leaves 1,285 cases, including 202 deaths, indicated as prevented in these 498 outbreaks by isolation and disinfection. By the same method of computation for each year, the indirect saving during the seventeen years, 1887-1903, is 37,988 cases, including 7,454 lives.

*Incubation period in diphtheria.*—By Table 10 it may be seen that for eleven years, 1892-1902, the period of incubation in diphtheria was reported in the greatest number of instances (229) as seven days, in the next greatest number of instances (126) as five days, and in the next greatest number of instances (103) as four days. Seven days were also reported in the most instances in 1903. The total number of instances in which the period of incubation was reported in days was, for the eleven years 1,258, and for the year 1903 it was reported in 112 instances. The average reported period of incubation for the eleven years was 8.2 days, and for the year 1903 it was 8.1 days.

TABLE 10.—*Exhibiting for the 11 years, 1892-1902, and for the year 1903, the reported period of incubation in days, in cases of diphtheria in Michigan. Compiled from reports of health officers in Michigan.*

Incubation period—days.....	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
Instances* in each day, for eleven years, 1892-1902.....	21	86	85	103	126	75	229	87	74	111	21	32	14	87	27	6	6	
Instances* in each day, for the year, 1903.....	2	3	7	9	12	5	25	3	10	13	3	4	....	12	....	1	....	
Incubation period—days.....	18	19	20	21	22	24	25	27	28	29	30	31	32	35	36	40	43	46
Instances* in each day, for eleven years, 1892-1902.....	7	2	6	16	4	8	3	....	8	1	6	1	1	1	1	1	1	1
Instances* in each day, for the year, 1903.....	1	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....

\* In many of these instances it was reported as *about* the number of days stated.

*Ages of fatal and non-fatal cases of reported diphtheria.*—Of the 3,670 persons sick with diphtheria in 1903, the ages of patients were reported in 2,933 instances. Of the 569 decedents, the ages were reported in 563 instances. Table 11 shows that the fatality was highest in children under five years of age, and especially high (sixty-eight per cent) in infants under one year. Table 12 shows that during the eleven years, 1892-1902, the ages of 24,427 cases of diphtheria, including the ages of 5,369 decedents, were reported to this office. Of these the greatest per cent was from five to nine years of age; and about seventy-seven per cent of this number (24,427) was under fourteen years of age. The greatest per cent of the ages of decedents was under



five years, and about seventy-eight per cent was in children under ten years. By Table 13 it may be seen that, for the period of ten years, 1893-1902, the greatest per cent of the ages of the decedents was under five years, both for males and females.

*Average age of fatal and non-fatal cases of reported diphtheria.*—Table 13 shows that the average age of fatal cases for 1903 was 6.0 years for males and 8.6 years for females; and for the ten years, 1893-1902, it was 6.6 years for males and 7.7 years for females. Table 14 shows that the average age of non-fatal cases was 11.2 years for males and 12.5 years for females; and for the ten years, 1893-1902, it was 9.6 years for males, and 13.2 years for females.

TABLE 11.—*Exhibiting in certain age-groups, the numbers of cases and deaths from diphtheria, the per cent that the cases in each group were of all cases of known ages; the per cent that the deaths in each group were of all deaths of known ages; and the per cent that the deaths in each group were of the cases in that group. Compiled from all reports for the year 1903, which stated the ages.*

Ages in groups of years.	Number and per cent of cases and deaths in certain age-groups.																
	All known ages.	0-1.	1-2.	2-3.	3-4.	4-5.	Under 5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50 and over.
Number of cases*.....	2,933	38	83	127	203	188	639	1052	591	250	145	80	51	48	38	20	19
Per cent the cases in each group were of all cases of known ages.....	100	1.3	2.8	4.3	6.9	6.4	21.8	35.9	20.2	8.5	4.9	2.7	1.7	1.6	1.3	.7	.6
Number of deaths.....	563	26	40	53	64	49	232	199	78	27	10	3	3	6	2	2	1
Per cent the deaths in each group were of all cases in that group.....	19.2	68.4	48.2	41.7	31.5	26.1	36.3	18.9	13.2	10.8	6.9	3.8	5.9	12.5	5.3	10.0	5.3
Per cent the deaths in each group were of deaths, known ages.....	100	4.6	7.1	9.4	11.4	8.7	41.2	35.3	13.9	4.8	1.8	.5	.5	1.1	.4	.4	.2
Per cent the deaths in special groups were of all deaths, known ages.....		41.2					76.5			20.5		3.1					

\* Does not include those cases or deaths where the age was not stated.

*Duration of sickness of fatal and non-fatal cases of diphtheria.*—Of the 569 fatal cases of diphtheria in 1903, the duration of sickness was reported in 465 instances; 230 of these were males and 235 were females. Table 15 shows that the duration of sickness of fifty-seven per cent of the males and fifty-four per cent of the females ranged from one to five days. Ninety-two per cent of males and ninety per cent of females were sick from one to fifteen days. For the ten year period, 1893-1902, the duration of only seventy-four per cent of males and seventy-five per cent of females ranged from one to fifteen days. As shown in Table 16, of the non-fatal cases of diphtheria,

in 1903, seventy-nine per cent of males and seventy-seven per cent of females recovered before the sixteenth day of sickness; and for the ten years, 1893-1902, seventy-one per cent of males and seventy per cent of females were sick less than sixteen days.

*Average duration of sickness from diphtheria.*—By Tables 15 and 16 it may be seen that the average duration of sickness from reported diphtheria in 1903 was shorter than for the ten year period, 1893-1902. For males, 6.6 days and for females 6.9 days in 1903, while for the ten years it was about twelve days for both sexes in fatal cases. In non-fatal cases in 1903, the duration was eleven days for males and eleven and one-half days for females, and for the ten years, about thirteen days for both sexes.

TABLE 12.—*Exhibiting in certain age-groups, the numbers of cases and deaths from diphtheria in the year 1903; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths, also totals for the 11 years, 1892-1902. Compiled from all reports for the years 1892-1902, which stated the ages.*

Year.		Total No. included.	Per cent of cases and deaths in certain age-groups.											
			All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1903.	Cases.....	2,933	100	21.8	35.9	20.2	8.5	4.9	2.7	1.7	1.6	1.3	.7	.6
	Deaths.....	563	100	41.2	35.3	13.9	4.8	1.8	.5	.5	1.1	.4	.4	.2
1892-1902.	Cases.....	24,427	100	25.7	32.8	18.5	8.5	4.8	3.4	2.5	1.6	1.0	.6	.6
	Deaths.....	5,369	100	44.5	33.2	13.0	4.3	1.9	1.2	.7	.4	.2	.2	.4

TABLE 13.—*Exhibiting, by sex and in certain age-groups, the per cent of persons who died from diphtheria in Michigan in 1903, and during the 10 years, 1893-1902; also the average age of death, and the number of deaths included. Compiled from such reports as stated the ages.*

Deaths from diphtheria.					Ages.—In periods of years. Per cent of deaths in each period of age.							
Year.	Sex.	Average age, years.	No. of deaths included.		All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 years and over.
1903.	Males.....	6.0	275		100	51.0	32.0	12.7	2.2	.4	0	1.8
	Females.....	8.6	288		100	31.9	38.5	14.9	7.3	3.1	1.0	3.1
1893-1902.	Males.....	6.6	2,355		100	46.0	33.8	11.8	4.5	1.7	.7	1.4
	Females.....	7.7	2,538		100	40.2	34.3	14.9	4.4	1.9	1.8	2.5



TABLE 14.—*Exhibiting, by sex, the per cent of persons in certain age groups who recovered from diphtheria, in Michigan in 1903, and during the 10 years, 1893-1902, also the average age and the number of cases included. Compiled from such reports as stated the ages.*

Year.	Sex.	Average age of non-fatal cases, years.	Number of cases included.	Age.—In periods of years. Per cent of non-fatal cases in each period of age.											
				All ages.	Under five years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1903.	Males.....	11.2	1,081	100	18.2	39.7	20.5	8.4	4.4	2.7	1.9	1.1	1.5	.7	.8
	Females.....	12.5	1,289	100	16.3	32.9	22.6	10.2	6.7	3.7	2.2	2.3	1.6	.8	.7
1893-1902.	Males.....	9.6	8,189	100	22.3	35.3	20.2	9.2	4.5	3.0	2.1	1.4	1.0	.5	.4
	Females.....	13.2	9,715	100	16.9	30.7	21.3	10.1	6.6	4.6	3.8	2.6	1.6	.8	1.0

TABLE 15.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from diphtheria, in Michigan, during the year 1903, and in the 10 years, 1893-1902. Per cent of deaths arranged in five-day groups. Compiled from those reports which stated the length of time the patient was sick.*

## Fatal cases of diphtheria.

Year.	Sex.	Average duration of fatal cases.	No. of fatal cases included.	Duration of sickness.—Per cent of deaths in each period of days.								
				All cases.	1 to 5 days.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 and over.
1903.	Males.....	6.6	230	100	57	27	8	5	2	.4	.9	.9
	Females.....	6.9	235	100	54	27	9	6	2	.9	.4	.9
1893-1902.	Males.....	11.5	5,758	100	22	32	20	11	8	3	1	2
	Females.....	11.9	6,744	100	21	33	21	11	8	3	1	2

TABLE 16.—*Exhibiting, by sex of patient, the duration (in days) of non-fatal cases of sickness from diphtheria, in Michigan, during 1902, and in the 10 years, 1893-1902. Per cent of non-fatal cases arranged in five-day groups. Compiled from those reports which stated the length of time the patient was sick.*

## Non-fatal cases of diphtheria.

Year.	Sex.	Average duration of non-fatal cases.	No. of cases included.	Duration of sickness.—Per cent of non-fatal cases in each period of days.								
				All periods.	1 to 5 days.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 and over.
1903.	Males.....	11.0	986	100	21	37	21	10	5	3	.9	1.1
	Females.....	11.5	1,185	100	19	39	19	11	7	3	1	1.4
1893-1902.	Males.....	13.2	5,487	100	13	35	23	13	9	4	1	2
	Females.....	13.2	6,601	100	12	35	23	14	9	3	2	2



WHOOPING-COUGH IN MICHIGAN DURING THE YEAR ENDING  
DECEMBER 31, 1903.

During the year ending December 31, 1903, there were reported to the Secretary of the State Board of Health, 357 outbreaks of whooping-cough in 337 localities in Michigan, which resulted in 4,172 cases,\* including 361 deaths.

Excluding Alpena, from which only the ten fatal cases were reported, and Detroit, from which only the forty-three fatal cases were reported, the average number of cases per locality, in 1903, was 12.30. The average number of deaths per locality was 1.07 deaths. Excluding Alpena and Detroit, the fatality from this disease, i. e., the proportion of cases which proved fatal, was 7.48 per cent, or about seven deaths to 100 cases. If the fatality in Alpena and Detroit was the same as in the other parts of the State, the number of cases in these cities was 709; which if added to the 4,119 cases, the number of reported cases in the State exclusive of the fifty-three fatal cases in Alpena and Detroit, would have made 4,828 cases.

The death-rate from this disease for the State, according to the reports to this office, was 14.4 deaths per 100,000 inhabitants.

*Whooping-cough in 1903 compared with previous years.*—Table 1 shows that in 1903, as compared with the averages for the sixteen years, 1887-1902, the number of reported cases was 546 more and the reported deaths 244 more. The increase in the reported number of deaths may not indicate a greater fatality from this disease in 1903, but only that the fatal cases are being more frequently and carefully reported. There are still cases of whooping-cough in other parts of Michigan than Detroit and Alpena which are not reported; in many instances the fatal cases, only, are reported and even not all fatal cases are yet reported to this office, as shown by the fact that for the year 1903 there were reported to the Secretary of State 370 deaths from whooping-cough, while only 361 were reported to the Secretary of the State Board of Health.

So far as relates to deaths, whooping-cough is of far greater importance to the people of Michigan than smallpox is, yet the reporting of the disease cannot be enforced because of the imperfect law on the subject. The legislature has been repeatedly asked to so amend the law as to have some competent authority decide what diseases are "dangerous to the public health" and therefore required to be reported; but thus far the old imperfect law continues, and the diseases most dangerous to the public health cannot be restricted because they are not reported to the health officials.

Table 1, and comments thereon are based upon reports to the office of the State Board of Health. Table 2, and comments thereon are based upon returns of deaths, made to the Secretary of State. For all years preceding 1898 the statistics of deaths were collected after the close of the year in which they occurred, and it is believed that not all deaths were reported; for all years after 1897 the deaths were recorded before burial, and returns were made to the Secretary of State early in the following month. There is reason to believe that under the new law nearly all deaths are included in the statistics, whereas before 1898 a considerable proportion was omitted. This

\* Throughout this article "cases" include deaths unless the word non-fatal is used

fact should be held in mind in comparing the deaths reported for the year 1903 with those reported in years previous to 1898, also in comparing the death rates of 1898-1903 with those for preceding years.

TABLE 1.—*Whooping-cough in Michigan in 1903, and the total and average for the 16 years, 1887-1902. Exhibiting the numbers of reported cases and deaths and the number of localities in which the presence of the disease was reported, together with the cases and deaths per locality and per 100,000 inhabitants, and the per cent the deaths were of cases. Compiled from reports received at the office of the Secretary of the State Board of Health.*

Year.	Cases.	Deaths.	Localities.	Cases per locality.	Deaths per locality.	Cases per 100,000 inhabitants.	Deaths per 100,000 inhabitants.	Per cent deaths were of cases.
1903.....	*4,172	361	337	†12.30	1.07	†188.1	14.4	†7.48
Totals, 1887-1902.....	58,015	1,876	3,562					
Av. for 16 years	3,626	117	223	16.29	.53	161.3	5.2	3.52

\* In numerous instances only the fatal cases were reported to this office.

† Exclusive of Alpena, from which only the ten fatal cases were reported, and of Detroit, from which only the forty-three fatal cases were reported.

TABLE 2.—*Exhibiting the reported number of deaths from whooping-cough per 100,000 persons living in Michigan in each of the 35 years, 1869-1902. Compiled from the Secretary of State's Vital Statistics of Michigan. Population estimated by average annual increase.*

Year.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.
Deaths (per 100,000, etc.).....	13.9	10.1	5.5	15.1	15.6	11.2	7.2	12.4	8.7	8.5	10.2	16.1	8.4	5.0
Year.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Deaths (per 100,000, etc.).....	5.2	8.8	7.4	9.7	5.6	8.7	6.8	3.6	7.4	6.7	7.8	7.0	6.1	6.8
Year.	1897.	1898.	1899.	1900.	1901.	1902.	1903.							
Deaths (per 100,000, etc.).....	4.5	12.0	10.0	8.6	6.4	11.8	14.9							

The statement of the death rate for 1903 is based upon the ephemeral publication, the Bulletin of Vital Statistics; the final compilation of whooping-cough by the State Department Division of Vital Statistics in 1903 has not yet been completed, so that the death-rate stated may be changed later, because where two diseases are mentioned as causing death, as not infrequently occurs, not always the same one is used in the final compilation as in the Bulletin of Vital Statistics. It is believed that the death rate shown in Table 3 (14.4) is probably nearly correct.



*Distribution of whooping-cough by counties in Michigan during 1903.*—Table 3 exhibits the distribution of whooping-cough by counties in this State during the year 1903, according to the reports made to the Secretary of the State Board of Health. The table shows the reported numbers of cases and deaths, also the sickness and death rates from whooping-cough in each county from which the disease was reported.

*Sickness and death-rates from reported whooping-cough.*—Table 3 shows that the sickness-rate for the State, in 1903, was 188.1 cases per 100,000 population. This rate is exclusive of Detroit,—with a population of 309,657, from which only the forty-three fatal cases were reported, and of Alpena,—with a population of 11,634,—from which only the ten fatal cases were reported. The population of these cities used in this table was estimated for 1903 by the Department of State.

The highest sickness-rate, by counties, was in Schoolcraft county, where the rate was 6,205.4 cases per 100,000 population.

The lowest sickness-rate, by counties, 7.0 cases per 100,000 population, was in Branch county. Gladwin county, having a sickness-rate 13.5 cases per 100,000 population, and Saginaw county, 14.8 cases per 100,000 population, had the next lowest sickness-rates.

Table 3 also shows that the death-rate for the State in 1903 was 14.4 deaths per 100,000 population. The highest death-rate, by counties, was in Alger county, 148.1 deaths per 100,000 population.

From seven counties from which sickness from whooping-cough was reported there were no deaths reported from this disease. The lowest death-rate, from counties from which deaths were reported, was in Monroe county, —3.1 deaths per 100,000 population. Eaton and Hillsdale counties, having death-rates of 3.2 and 3.4 deaths per 100,000 population, were next lowest.

*Whooping-cough in each month of the year, 1903.*—By Table 4 it appears that the prevalence of whooping-cough is quite uniform throughout the year. A study of Table 14, of the article on "Sickness Statistics" in this report, shows that whooping-cough, according to the weekly card-reports made to this office, during the ten years, 1893-1902, varied but little in the different months; the *lowest* monthly average of reports which stated the presence of whooping-cough was 5 per cent of all reports received, while the *highest* monthly average was only 8 per cent. The general monthly average for the ten years was 7 per cent.

Table 5 shows the number of localities in Michigan at which whooping-cough was reported present in each month of the year 1903, the number of cases taken sick in each month, and the number of cases present in each month.



TABLE 3.—Number of cases and deaths reported from whooping-cough per 100,000 persons living in each county in Michigan during the year 1903. Compiled from reports of health officers.

State and counties.	Population of Michigan for 1903.*	Number of reported		Number per 100,000 population, of		Counties.	Population of Michigan for 1903.*	Number of reported		Number per 100,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,510,652	†4,172	361	† 188.1	14.4	Keweenaw.....	3,421	7	0	204.6	0
						Lake.....	4,487	18	0	401.2	0
Alcona.....	5,826	16	1	274.6	17.2	Lapeer.....	27,024	15	4	55.5	14.8
Alger.....	8,103	21	12	259.2	148.1	Leelanau.....	11,045	0	0	0	0
Allegan.....	38,624	61	6	157.9	15.5	Lenawee.....	48,338	79	4	142.7	8.3
Alpena.....	18,521	†15	10	†72.6	54.0	Livingston.....	19,278	6	1	31.1	5.2
Antrim.....	18,632	10	2	53.7	10.7	Luce.....	3,298	32	2	970.3	60.6
Arenac.....	11,258	2	3	17.8	26.6	Mackinac.....	7,934	17	0	214.3	0
Baraga.....	4,365	1	1	22.9	22.9	Macomb.....	33,670	36	5	106.9	14.9
Barry.....	21,921	65	2	296.6	9.1	Manistee.....	28,723	30	3	104.4	10.4
Bay.....	62,912	17	8	27.0	12.7	Marquette.....	42,850	340	24	793.5	56.0
Benzie.....	10,489	4	2	38.1	19.0	Mason.....	19,113	44	3	230.2	15.7
Berrien.....	50,926	78	2	153.2	3.9	Mecosta.....	20,675	31	1	149.9	4.8
Bosch.....	28,609	2	2	7.0	7.0	Menominee.....	27,593	54	5	195.7	18.1
Calhoun.....	50,233	48	8	95.6	15.9	Midland.....	15,048	221	1	1,468.6	6.6
Cass.....	20,726	63	2	304.0	9.6	Missaukee.....	10,478	25	3	238.6	28.6
Charlevoix.....	15,099	5	2	33.1	13.2	Monroe.....	32,542	57	1	175.2	3.1
Cheboygan.....	16,413	7	3	42.6	18.3	Montcalm.....	32,053	28	3	87.4	9.4
Chippewa.....	24,338	68	6	279.4	24.6	Montmorency.....	3,630	96	0	2,644.6	0
Clare.....	8,549	22	0	257.3	0	Muskegon.....	36,932	31	6	83.9	16.2
Clinton.....	24,573	29	3	118.0	12.3	Newaygo.....	16,948	4	3	23.6	17.7
Crawford.....	3,057	0	0	0	0	Oakland.....	45,848	43	5	93.8	10.9
Delta.....	26,185	106	7	404.8	26.7	Oceana.....	17,665	54	3	305.7	17.0
Dickinson.....	19,463	39	5	200.4	25.7	Ogemaw.....	8,827	0	0	0	0
Eaton.....	31,195	86	1	275.7	3.2	Ontonagon.....	5,859	15	0	256.0	0
Emmet.....	18,700	105	7	561.5	37.4	Oscoda.....	18,549	13	2	70.1	10.8
Genesee.....	42,428	14	5	33.0	11.8	Oscoda.....	1,300	0	0	0	0
Gladwin.....	7,392	1	0	13.5	0	Otsego.....	6,862	159	5	2,317.1	72.9
Gogebie.....	18,064	28	3	155.0	16.6	Ottawa.....	39,955	37	8	92.6	20.0
Grand Traverse.....	21,958	38	2	173.1	9.1	Presque Isle.....	10,270	2	2	19.5	19.5
Gratiot.....	30,444	29	4	95.3	13.1	Rosecommon.....	1,850	2	2	108.1	108.1
Hillsdale.....	29,662	39	1	131.5	3.4	Saginaw.....	80,911	12	5	14.8	6.2
Houghton.....	76,998	137	20	177.9	25.9	Sanilac.....	35,607	10	9	28.1	25.3
Huron.....	35,113	279	9	704.6	25.6	Schoolcraft.....	8,267	513	3	6,205.4	36.3
Ingham.....	39,881	26	3	65.2	7.5	Shiawassee.....	34,370	21	4	61.1	11.6
Ionia.....	34,084	59	2	173.1	5.9	St. Clair.....	55,678	24	3	43.1	5.4
Iosco.....	9,201	9	3	97.8	32.6	St. Joseph.....	23,290	78	2	334.9	8.6
Iron.....	10,835	0	0	0	0	Tuscola.....	36,625	29	9	79.2	24.6
Isabella.....	23,453	11	1	46.9	4.3	Van Buren.....	34,375	53	7	154.2	20.4
Jackson.....	49,062	14	7	28.5	14.0	Washtenaw.....	49,885	100	3	200.5	6.0
Kalamazoo.....	45,435	25	4	55.0	8.8	Wayne.....	376,951	§107	50	§95.1	13.3
Kalkaska.....	7,877	0	0	0	0	Wexford.....	18,240	30	1	164.5	5.5
Kent.....	133,596	120	10	89.8	7.5						

\* Population estimated by average annual increase.

† Exclusive of Alpena and Detroit, from which only the fifty-three fatal cases were reported.

‡ Exclusive of Alpena, from which only the ten fatal cases were reported.

§ Exclusive of Detroit, from which only the forty-three fatal cases were reported.

TABLE 4.—*Exhibiting the reported number of outbreaks of whooping-cough which were present, in each month of the year 1903, in the different local jurisdictions of Michigan.*

Months.....	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Outbreaks present.....	74	87	93	91	96	86	89	81	73	61	52	48

TABLE 5.—*Exhibiting the number of localities infected with whooping-cough, the number of cases of whooping-cough present, and the number of cases taken sick, in Michigan, in each month during the year 1903.*

	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number of localities.....	337	74	87	93	91	95	85	88	81	73	61	52	48
Number of cases taken sick.....	*2,000	165	131	153	174	193	178	211	182	106	124	163	220
Number of cases present.....	282	305	320	357	390	432	401	423	310	240	262	340	

\* Of the 4,172 cases of whooping-cough reported in 1903, the months in which they were taken sick were reported in but 2,000 instances.

TABLE 6.—*The number of deaths from whooping-cough in each month of the year 1903, and the per cent the deaths in each month were of all the deaths from whooping-cough in 1903, reported to the office of the State Board of Health.*

Months.....	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Number of deaths.....	32	29	29	36	26	25	41	42	27	19	27	26	359
Per cent of deaths.....	8.9	8.1	8.1	10.0	7.2	7.0	11.4	11.7	7.5	5.3	7.5	7.2	.....

Table 6 shows that the greatest number of deaths from whooping-cough occurred during the summer months, the largest number of deaths reported for any one month, 42, having occurred in August and the next largest number, 41, in July. The month for which the least number of deaths was reported was October, there being only nineteen deaths reported as having occurred in that month.

*Source of contagium of whooping-cough and how the disease is spread.*—Of the 4,172 cases of whooping-cough reported, during the year 1903, the local health officers reported the source of contagium as follows: Traced to a former case, 401; from outside jurisdiction, 47; probably from outside jurisdiction, 4; unknown, 2,715; not stated or indefinitely reported, 1,005.

*Outbreaks of whooping-cough traced to previous outbreaks.*—According to reports of local health officers in Michigan the contagium of whooping-cough in 53 outbreaks, with an aggregate of 686 cases, including eighteen deaths, was traced to outside jurisdictions. From one of these second localities the contagium was permitted to spread to one other locality resulting in two cases. Five outbreaks were reported as *probably* traced to preceding outbreaks.

Eleven outbreaks, with an aggregate of seventy-one cases, including one death, were traced to places outside of Michigan.

*Transgression of the public health laws.*—Strict isolation and disinfection enforced in the outbreaks of whooping-cough would have lessened to a considerable degree the number of cases and deaths from the disease in 1903, and the carelessness on the part of the people generally approaches criminality. Such carelessness must be due to ignorance of the importance of the disease, for whooping-cough, for the past nine years, has caused more deaths in Michigan than either scarlet fever or measles,\* and in 1903 the death-rate from whooping-cough was equal to the combined death-rates of scarlet fever and measles. When this information has become sufficiently familiar to the people of the State, and the vital necessity of the isolation and disinfection of the disease is fully understood, then coöperation may be expected, and a diminution of the number of cases and deaths from whooping-cough may be expected.

The following quotations from reports of local health officers show some of the difficulties experienced by health officers in restricting this disease:

"I have whooping-cough reported in two houses. I am satisfied the disease has existed in a number of houses a month or two previous to this time. People here have a great dislike to placarding and will lie and deceive a health officer to avoid the placard. I only found out these two families by spending a time at their houses waiting to hear a paroxysm of coughing. No doctor has been called to any cases I know of and I believe we would be employed oftener only for the dread of placarding; they treat themselves and avoid doctors. The sick children are playing outdoors every day. No danger and possibly may be well now, but will not fumigate for a time yet."

"It is my impression that I reported the cases of pertussis at Mr. F's to the local health officer but if I did not, I herewith enclose report to you. The facts are that there has been an epidemic of whooping-cough here with hundreds of cases, many of whom have not called a physician, none of which cases have been placarded and visited by health officer.

"The baby in question died as a secondary result of whooping-cough, the disease itself having subsided to be renewed by taking cold, lung congestions, and spasms, of which it died.

"Kindly send me twenty more pamphlets on restriction of whooping-cough. Fear there is going to be quite an epidemic in this village, as every person opposes me in endeavoring to prevent spread by claiming they never before saw children kept from school and detained in their homes for having whooping-cough."

While some of the localities in the State, and a portion of the people, are in sympathy with the modern sanitary thought and the restriction of this disease, and while the conditions shown in the above quotations do not exist in every locality, still reports from various parts of the State show similar difficulties met by local health officers and physicians in restricting this disease.

Table 8 shows that of 335 outbreaks, in 173 of them isolation and disinfection were either not mentioned or statements were so doubtful as to be impossible of classification; a majority of them were probably neglected; in four outbreaks disinfection was enforced and isolation was doubtful; in ten outbreaks, isolation was enforced, but disinfection was doubtful; in fifteen outbreaks disinfection was enforced and isolation was neglected; in eleven outbreaks isolation was enforced and disinfection was neglected; in one hundred and four outbreaks isolation and disinfection were both neglected, and out of the 335 outbreaks reported, only eighteen were reported as enforced. The results of the different modes of action are shown in Table 8.

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\* According to the returns made to the Secretary of State.



TABLE 8.—WHOOPING-COUGH IN MICHIGAN IN 1903.—Exhibiting the average numbers of cases and deaths per outbreak:—(1) in all the 395 outbreaks reported; (2) in the 173 outbreaks in which it is doubtful whether or not disinfection or isolation was enforced; (3) in the 4 outbreaks in which disinfection was enforced and isolation doubtful; (4) in the 10 outbreaks in which isolation was enforced and disinfection was doubtful; (5) in the 15 outbreaks in which disinfection was enforced and isolation neglected; (6) in the 11 outbreaks in which isolation was enforced and disinfection neglected; (7) in the 104 outbreaks in which isolation and disinfection were both neglected; (8) in the 18 outbreaks in which isolation and disinfection were both enforced.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
All outbreaks.																
	(335 outbreaks.)		(173 outbreaks.)		(4 outbreaks.)		(10 outbreaks.)		(15 outbreaks.)		(11 outbreaks.)		(104 outbreaks.)		(18 outbreaks.)	
Totals . . . . .	3,594	232	1,240	124	6	2	43	2	66	10	51	4	2,139	83	49	7
Averages . . . . .	10.73	.69	7.17	.72	1.50	.50	4.30	.20	4.40	.66	4.64	.36	20.57	.80	2.72	.39

*Estimated number of cases of whooping-cough prevented and lives saved by isolation and disinfection.*—Comparisons are made in Table 8, of the average numbers of cases and deaths in outbreaks of whooping-cough where the measures of isolation and disinfection prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in outbreaks where these measures were neglected\*.

TABLE 9.—*Exhibiting for the six years, 1897-1902, and for the year 1903, the reported period of incubation in days, in cases of whooping-cough in Michigan. Compiled from reports of health officers in Michigan.*

Incubation period—days..	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	28	30
Instances* in each day, for six years, 1897-1902	1	....	....	1	14	6	23	35	4	4	....	50	2	....	1	3	7	3	2
Instances* in each day, for the year 1903.....	....	1	1	....	3	1	4	8	....	1	1	3	....	1	....	....	2	....	....

\* In many of these instances it was reported as *about* the number of days stated.

By this table (8) it may be seen that during the year 1903 there were reported to the office of the State Board of Health 335† outbreaks of whooping-cough, with 3,594 cases, including 232 deaths. Had no efforts at restriction been made, and had the average number of cases and deaths per outbreak remained the same as in the column headed "Isolation and disinfection both neglected," there would have occurred 6,891 cases, including 268 deaths. Had the average numbers of cases and deaths in all outbreaks been the same as those in the column headed "Isolation and disinfection both enforced," there would have occurred only 911 cases, including 131 deaths, or 2,683 cases of sickness, including 101 deaths, from whooping-cough would have been prevented.

*Incubation period in whooping-cough.*—By Table 9 it may be seen that for six years, 1897-1902, the period of incubation in whooping-cough was reported in the greatest number of instances (50) as fourteen days, and the incubation period reported in the next greatest number of instances (35) was ten days. Ten days were also reported in the most instances in 1903. The total number of instances in which the period of incubation was reported in days was for the six years, 156, and for the year 1903 it was reported in twenty-six instances. The average reported period of incubation for the six years was 12.2 days, and for the year 1903 it was 10.7 days.

\* In the compilation of the reports for Table 8 showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed, "Isolation and disinfection both neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed, "Isolation and disinfection enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed, "Isolation or disinfection or both not mentioned; or statements doubtful."

† Whenever a break of sixty days or more has occurred in the progress of a communicable disease in a given township, village or city it has been regarded as two different outbreaks, but if the second appearance of the disease could be traced from the first the intermission was disregarded and it was treated as a single outbreak. Also, comparisons of *years* require that outbreaks be counted as closed at the end of the *year*: while in comparing *outbreaks* for testing the value of isolation and disinfection it is necessary to take *complete outbreaks*, even where they extend from one year into the next. This explains the apparent discrepancy between the number of outbreaks here given and the number given at the beginning of this article.

*Ages of fatal and non-fatal cases of whooping-cough.*—From Table 10 it may be seen that 90 per cent of all the sickness, and ninety-nine per cent of all the deaths from whooping-cough occurred in children under ten years of age; that the fatality from this disease was greatest in children under one year old—eighty-one per cent of the reported cases of that age having proved fatal; and, also, that sixty-three per cent of all deaths from this disease were in children under one year old.

TABLE 10.—*Exhibiting in certain age-groups, the numbers of cases and deaths from whooping-cough, the per cent that the cases in each group were of all cases of known ages; the per cent that the deaths in each group were of all deaths at known ages; and the per cent that the deaths in each group were of all the cases in that group. Compiled from all reports for the year 1903, which stated the ages.*

	Number and per cent of cases and deaths in certain age-groups.*																
Ages in groups of years.	All known ages.	0-1.	1-2.	2-3.	3-4.	4-5.	Under 5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50 and over.
No. of cases†.....	1,164	274	166	120	103	88	751	295	93	13	2	4	3	0	0	0	3
Per cent the cases in each group were of all cases of known ages .....		24	14	10	9	8	65	25	8	1	.2	.3	.3	0	0	0	.3
No. of deaths.....	355	222	77	20	15	6	340	12	1	2	0	0	0	0	0	0	0
Per cent the deaths in each group were of all cases in that group.....	30	81	46	17	15	7	45	4	1	15	0	0	0	0	0	0	0
Per cent the deaths in each group were of all deaths, known ages.....		63	22	6	4	2	96	3	.3	.6	0	0	0	0	0	0	0
Per cent the deaths in special groups were of all deaths, known ages.....		96					99					.8					

\* In dividing the ages into five-year periods, the first period includes all ages from birth to five years, or all under five years of age. The second five-year period includes all ages of five years and over and less than ten years. In each succeeding period the same arrangement is followed.

† Includes deaths from this disease.

TABLE 11.—*Exhibiting, by sex, the per cent of persons in certain age-groups who recovered from whooping-cough, in Michigan, during the year 1903; also the average age and number of cases included. Compiled from such reports as stated the ages.*

Year.	Sex.	Average age of persons who recovered, years.	No. of cases included.	Age.—In periods of years. Per cent of (non-fatal) cases in each period.*										
				All ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 and over.
1903.	Males.....	5.5	404	100	49.8	36.6	11.9	.2	.2	.5	.2	0	0	.5
	Females.....	5.4	405	100	51.9	33.3	10.9	2.5	.2	.5	.5	0	0	.2

\* A foot-note to Table 10 explains these age-groups.



Table 12 shows that all but four per cent of the reported deaths from whooping-cough, in which the ages were stated, were in children under five years of age.

TABLE 12.—*Exhibiting, by sex, the per cent of persons in certain age-groups who died of whooping-cough during the year 1903.*

Year.	Sex.	Average age of decedents.	No. of deaths included.	Per cent of deaths in certain age-groups.*					
				All ages.	Under 5.	5 to 9.	10 to 24.	25 to 39.	40 to 44.
1903.	Males.....	1.0	165	100	98.2	.6	1.2	0	0
	Females.....	1.3	190	100	93.7	5.8	.5	0	0

\* A foot-note to Table 10 explains these age-groups.

The average age of non-fatal cases of whooping-cough in 1903 was 5.5 years for males and 5.4 for females; for fatal cases the average age was 1.0 year for males and 1.3 years for females.

*Duration of sickness from whooping-cough.*—The duration of sickness from whooping-cough was given in 600 cases that recovered from this disease and in 148 fatal cases. Table 14 shows that the greatest per cent of non-fatal cases were sick from thirty-one to thirty-five days.

The average duration of non-fatal cases was 38.9 days for males and 41.5 days for females; for fatal cases the average duration was 20.9 days for males and 19.2 days for females.

The lesson of the experience may well be summed up in the constant warning advanced and persisted in by the State Board of Health—"Prevent the disease by isolation of the first cases, disinfect the sick room and all that comes in contact with the patient," and the number of cases will be lessened, the deaths from whooping-cough will be diminished.

TABLE 13.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from whooping-cough, in Michigan, during the year 1903. Per cent of deaths arranged in five-day groups. Compiled from those reports which stated the length of time the patient was sick.*

Fatal cases of whooping-cough.																			
Year.	Sex.	Average duration.	Number of deaths included.	Duration of sickness:—Per cent of deaths in each period of days.															
				All periods.	1 to 5 days.		6 to 10.		11 to 15.		16 to 20.		21 to 25.		26 to 30.		31 to 35.		36 and over.
1903.	Males.....	20.9	75	100	9.3	18.7	16.0	12.0	17.3	12.0	4.0	10.7							
	Females.....	19.2	73	100	15.1	13.7	16.4	17.8	15.1	6.8	5.5	9.6							

TABLE 14.—*Exhibiting, by sex of patient, the duration (in days) of non-fatal cases of sickness from whooping-cough, in Michigan, during the year 1903. Per cent of cases arranged in five-day groups. Compiled from those reports which stated the length of time the patient was sick.*

Non-fatal cases of whooping-cough.																		
Year.	Sex.	Average duration.	No. of cases included.	Duration of sickness:—Per cent of cases in each period of days.														
				All periods.	1 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 to 60.	61 to 65.	66 to 70.	71 to 75.	76 and over.
1903.	Males.....	38.9	305	100	5.9	4.3	8.9	9.8	24.9	8.5	7.2	7.9	5.9	4.3	4.3	2.3	.7	5.2
	Females.....	41.5	295	100	4.7	3.4	8.5	9.8	24.4	7.1	7.1	6.1	6.4	7.5	1.0	2.0	1.4	10.5

SCARLET FEVER IN MICHIGAN.—YEAR ENDING DECEMBER '31,  
1903.

During the year ending December 31, 1903, there were reported to the Secretary of the State Board of Health, 948 outbreaks of scarlet fever in 696 localities in Michigan, which resulted in 5,353 cases,\* including 212 deaths.

The average numbers of cases of sickness and of deaths per outbreak, in 1903, were 5.65 cases, including .22 of one death. The fatality, i. e., the proportion of reported cases which proved fatal, was 4.0 per 100 cases.

TABLE 1.—SCARLET FEVER IN MICHIGAN.—Numbers of reported outbreaks, localities (in which they occurred), cases and deaths; average numbers of cases and deaths per outbreak, and the per cent of cases which proved fatal, as reported for the years 1902 and 1903, with the departures of the same for 1903 from 1902, and from the averages of the same for the 19 years, 1884-1902.

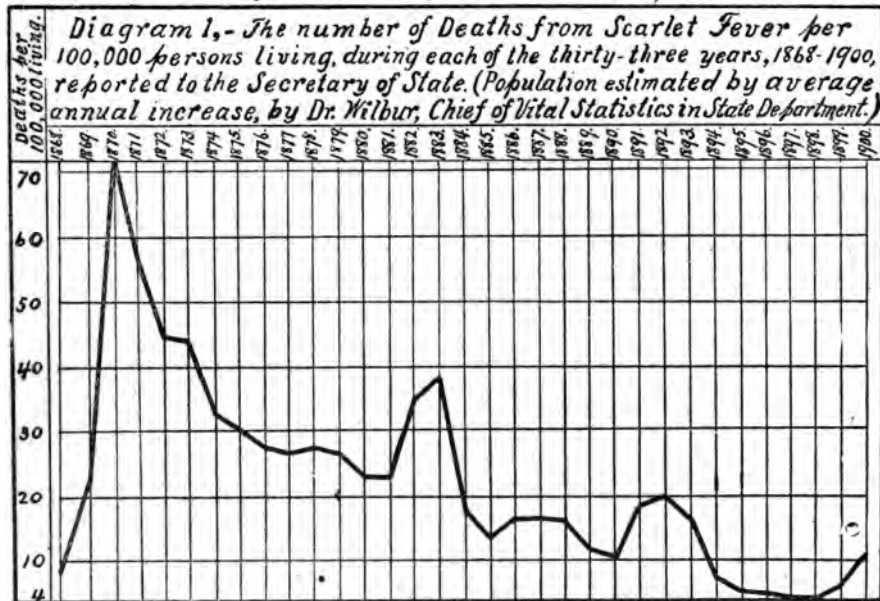
Year.	Reported outbreaks.	Reported localities.	Reported cases.*	Av. No. of cases per outbreak.	Reported deaths.	Av. No. of deaths per outbreak.	Deaths per 100 cases.
1902.....	1,014	759	6,582	6.49	248	.24	3.8
1903.....	948	696	5,353	5.65	212	.22	4.0
Departures of 1903 from 1902.....	—66	—63	—1,229	— .84	—36	— .02	+ .2
Av. for nineteen years, 1884-1902.....	556	454	4,406	7.92	230	.41	5.2
Departures of 1903 from the averages for 19 years, 1884-1902.....	+392	+242	+947	—2.27	—18	— .19	—1.2

\* Throughout this article, "cases" include deaths, unless the word non-fatal is used.

TABLE 2.—*Exhibiting the reported number of deaths from scarlet fever in Michigan per 100,000 population for each of the 36 years, 1868-1903. (The data for this table were supplied by C. L. Wilbur M. D., Chief of Division of Vital Statistics, Department of State.)*

Year.		1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	
Death rate.....		8.48	22.09	71.96	56.62	44.33	43.94	32.23	29.99	27.41	26.91	27.74	26.26	22.66	22.82	
Year.		1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Death rate..		34.25	37.94	17.91	13.13	16.69	16.25	16.13	11.72	10.60	18.70	20.23	16.30	7.27	5.09	4.58
Year.		1897.	1898.	1899.	1900.	1901.	1902.	1903.								
Death rate..		4.0	3.9	6.0	11.2	11.8	10.6	8.0								

*Reported Deaths from Scarlet fever in Michigan, 33 Years, 1868-1900.*



[PLATE IIII]

*Scarlet fever in 1903, compared with previous years.*—From year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports, and in the efforts made by local health authorities throughout the State to supply in their reports the information desired by the State Board. These facts, together with the constantly increasing population, make it difficult to determine the exact increase or decrease of prevalence of the disease in the State by comparison of



the numbers of outbreaks of the disease, and the cases and deaths resulting therefrom, and this should be borne in mind in studying Table 1. Because of these facts a constant increase in the reported prevalence of the disease might reasonably be expected.

In 1903 there were 1,229 cases and 36 deaths less than in 1902.

While the number of outbreaks in 1903 was almost double the average number for the nineteen years, 1884-1902, the average numbers of cases and deaths *per outbreak* were considerably less.

Table 1 and comments thereon are based upon reports to the office of the State Board of Health. Table 2, Diagram 1, and comments thereon are based upon returns of deaths, made to the Secretary of State. For all years preceding 1898 the statistics of deaths were collected after the close of the year in which they occurred, for all years after 1897 the deaths were recorded before burial, and returns were made to the Secretary of State early in the following month. There is reason to believe that under the new law nearly all deaths are included in the statistics, whereas, before 1898 a considerable proportion was omitted. This fact should be held in mind in comparing the deaths reported for the year 1903 with those reported in years previous to 1898. The final compilation of deaths from scarlet fever has not been made by the Division of Vital Statistics, in the State Department, consequently the death-rate computed for 1903 (8.0) may not be quite accurate; because where two diseases are mentioned as causing a death, as not infrequently occurs, not always the same one is used in the final compilation as in the Bulletin of Vital Statistics.

*Sickness-rates, by counties, from reported scarlet fever.*—While there has been a steady improvement in reporting cases of scarlet fever, it is probable that there are cases or light forms of the disease, requiring no physician, that are not reported. Consequently, the reported cases of scarlet fever are not as complete as the reports of deaths from this disease, yet comparisons may be made, subject to the mental reservation that not all cases are reported, and that the omissions may be greater in some parts of the State than in others.

Table 3 shows that the greatest sickness-rate from reported scarlet fever was in Lake county, where the ratio of cases to population was 869.2 to 100,000. Iosco county had the next highest rate, 815.1 cases per 100,000 population. Missaukee, Benzie, Kalamazoo, Macomb, Marquette, St. Clair, Washtenaw and Cass counties had high rates. Sickness from scarlet fever was reported from all but five counties—Alger, Crawford, Luce, Oscoda and Roscommon. Crawford county in 1900 and 1901 had the highest sickness-rates for those years; Oscoda had the highest rate for the year 1898, and high rates for the years 1899 and 1900; Luce had no sickness from scarlet fever in the years 1898, 1899 and 1900; and Roscommon had no sickness from this disease in the years 1898, 1899 and 1901.

*Death-rates, by counties, from reported scarlet fever.*—By Table 3 it may be seen that the greatest death-rate from reported scarlet fever, 36.3 deaths per 100,000 population, was in Schoolcraft county, and the counties of Cass, Huron, Macomb and Dickinson had nearly as high rates. These rates were over three times the average death-rate for the State. From twenty-four counties, from which an aggregate of 548 cases of scarlet fever was reported, there were no deaths reported from this disease. The lowest death-rates, in counties from which deaths were reported from scarlet fever, was in the counties of Berrien, Jackson, Genesee, Saginaw, Allegan, Tuscola, Ionia and Shiawassee. The death rates are now believed to be fairly accurate.

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TABLE 3.—Numbers of cases and deaths reported from scarlet fever, and the cases and deaths per 100,000 persons living in each county in Michigan during the year 1903. Compiled from reports of health officers.

State and counties.	Estimated population of Michigan for 1903.*	Number of reported		Number per 100,000 population, of		Counties.	Estimated population of Michigan for 1903.*	Number of reported		Number per 100,000 population, of	
		Cases.†	Deaths.	Cases.†	Deaths.			Cases.†	Deaths.	Cases.†	Deaths.
State.....	2,510,652	5,353	212	213.2	8.4	Keweenaw.....	3,421	5	0	146.2	0
						Lake.....	4,487	39	0	809.2	0
Alcona.....	5,826	2	0	34.3	0	Lapeer.....	27,024	59	4	218.3	14.8
Alger.....	8,103	0	0	0	0	Leelanau.....	11,045	3	0	27.2	0
Allegan.....	38,624	63	1	163.1	2.6	Lenawee.....	48,338	88	2	182.1	4.1
Alpena.....	18,521	12	1	64.8	5.4	Livingston.....	19,278	69	1	357.9	5.2
Antrim.....	18,632	14	0	75.1	0	Luce.....	3,298	0	0	0	0
Arenac.....	11,258	9	1	79.9	8.9	Mackinac.....	7,934	11	0	138.6	0
Barraga.....	4,365	6	0	137.5	0	Macomb.....	33,670	173	9	513.8	26.7
Barry.....	21,921	49	1	223.5	4.6	Manistee.....	28,723	52	3	181.0	10.4
Bay.....	62,912	41	0	65.2	0	Marquette.....	42,850	196	10	457.4	23.3
Benzie.....	10,489	60	2	572.0	19.1	Mason.....	19,113	35	1	183.1	5.2
Berrien.....	50,926	42	1	82.5	2.0	Mecosta.....	20,675	51	0	246.7	0
Branch.....	28,609	16	0	55.9	0	Menominee.....	27,593	43	4	155.8	14.5
Calhoun.....	50,233	79	3	157.3	6.0	Midland.....	15,048	57	2	378.8	13.3
Cass.....	20,726	84	6	405.3	29.0	Missaukee.....	10,478	80	2	763.5	19.1
Charlevoix.....	15,099	6	0	39.7	0	Monroe.....	32,542	57	1	175.2	3.1
Cheboygan.....	16,413	32	0	195.0	0	Montcalm.....	32,053	45	1	140.4	3.1
Chippewa.....	24,338	12	4	49.3	16.4	Montmorency.....	3,630	1	0	27.5	0
Clare.....	8,549	12	0	140.4	0	Muskegon.....	36,932	83	3	224.7	8.1
Clinton.....	24,573	70	0	284.9	0	Newaygo.....	16,948	56	0	330.4	0
Crawford.....	3,057	0	0	0	0	Oakland.....	45,848	63	2	137.4	4.4
Delta.....	26,185	26	2	99.3	7.6	Oceana.....	17,665	27	0	152.8	0
Dickinson.....	19,463	57	5	292.9	25.7	Ogemaw.....	8,827	5	1	56.6	11.3
Eaton.....	31,195	36	1	115.4	3.2	Ontonagon.....	5,859	19	1	324.2	17.1
Emmet.....	18,700	53	0	283.4	0	Oscoda.....	18,549	43	0	231.8	0
Genesee.....	42,428	140	1	330.0	2.4	Oscoda.....	1,300	0	0	0	0
Gladwin.....	7,392	21	0	284.1	0	Otsego.....	6,862	4	0	58.3	0
Gogebic.....	18,064	44	1	243.6	5.5	Ottawa.....	39,955	74	4	185.2	10.0
Grand Traverse.....	21,958	81	4	368.9	18.2	Presque Isle.....	10,270	13	1	126.6	9.7
Gratiot.....	30,444	49	1	170.0	3.3	Roscommon.....	1,850	0	0	0	0
Hillsdale.....	29,662	52	2	175.3	6.7	Saginaw.....	80,911	67	2	82.8	2.5
Houghton.....	76,998	123	18	159.7	23.4	Sanilac.....	35,607	129	9	362.3	25.2
Huron.....	35,113	88	10	250.6	28.5	Schoolcraft.....	8,267	7	3	84.7	36.3
Ingham.....	39,881	111	4	278.3	10.0	Shiawassee.....	34,370	53	1	154.2	2.9
Ionia.....	34,084	74	1	217.1	2.9	St. Clair.....	55,078	228	11	409.5	19.8
Iosco.....	9,201	75	2	815.1	21.7	St. Joseph.....	23,290	20	0	85.9	0
Iron.....	10,835	4	0	36.9	0	Tuscola.....	36,625	38	1	103.8	2.7
Isabella.....	23,453	77	1	328.3	4.3	Van Buren.....	34,375	66	5	192.0	14.5
Jackson.....	49,062	124	1	252.7	2.0	Washtenaw.....	49,885	204	9	408.9	18.0
Kalamazoo.....	45,435	251	4	552.5	8.8	Wayne.....	376,951	543	32	144.1	8.5
Kalkaska.....	7,877	11	0	139.6	0	Wexford.....	18,240	24	1	131.6	5.5
Kent.....	133,596	417	8	312.1	5.9						

\* Population estimated by average annual increase (arithmetical method), based on the State Census of 1894 and the U. S. Census of 1900.

† Include deaths from scarlet fever.



*Fatality, by counties, from reported scarlet fever.*—The fatality from reported scarlet fever in 1903 was, for the whole State, 4.0 or about one death to twenty-five cases. In Schoolcraft county, of the seven reported cases three proved fatal. Chippewa county had the next greatest fatality. In counties from which deaths from scarlet fever were reported, the fatality was lowest in the counties of Genesee and Jackson, one death per 140 cases in Genesee, and one death per 124 cases in Jackson county.

*Distribution of reported scarlet fever in cities, and in the rural districts.*—From data in Table 4 it may be observed that 88 per cent of the cities in Michigan, and 41 per cent of the rural districts were infected with scarlet fever. The highest case-rate (216.1) and the highest death-rate (8.5) occurred in the cities. The highest fatality (4.0 deaths per 100 cases) occurred in the rural districts, the fatality in the cities being slightly less.

*Scarlet fever in each month of the year 1903.*—The second line of figures in Table 5, representing the reported number of outbreaks present, is obtained by actual count of the number of outbreaks reported as existing in each month. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months.

The influence of seasonal changes upon the prevalence of scarlet fever may be seen by the fourth and fifth lines in Table 5. While present in the State during the entire year, it was least prevalent during the months of July, August and September, reaching a minimum in August.

*Source of contagium of scarlet fever, how the disease is spread, and the vitality of the contagium.*—Of the 5,353 cases of scarlet fever reported during the year 1903, the local health officers reported the source of contagium, as follows: Traced to a former case, 1,058; attributed to infected houses, articles, clothing, etc., 101; source of contagium unknown, 2,825; source of contagium not stated, 553; traced to an outside jurisdiction, 816.

That there is a specific germ which causes scarlet fever seems to be proved by the known communicability of the disease.

Reports of health officers and physicians indicate that the scarlet fever germ frequently retains its vitality for a long time outside of the human body, in an apparently dormant or inactive state, in houses, clothing, carpets, furniture, etc., and is then capable of developing scarlet fever in persons coming into such houses or in contact with or near such articles, thus showing the importance of carefully disinfecting all infected houses and articles, even when they are not to be used for a long time.

The following quotations are from a few of such reports sent to this office:—

"A Sunday dress taken from Moorehouse house to prevent its being fumigated, afterward worn by Mrs. Moorehouse when visiting Wager's. (Two cases developed as the result of this visit.)

"From the premises. There were two cases a year previous in same house." (There were ten cases in the last outbreak.)

"They had scarlet fever in same house one year ago." (There were three cases in the last outbreak.)

"Probably from some old clothing used by the family that had been laid away since the family had scarlet fever about seven years ago." (There were four cases in the last outbreak.)

"There was scarlet fever in house four years ago." (The last outbreak resulted in one fatal case.)



"By cape worn two years ago when had scarlet fever." (Three cases resulted from this source.)

"I think that it is from a house where they had scarlet fever last winter." (Six cases resulted from this source.)

"To playthings of child who had had scarlet fever a little over one year ago." (Two cases resulted from this source.)

"The mother had cleaned house where there had been scarlet fever some time ago." (Two cases resulted from this source.)

"By tearing old paper from wall and cleaning house." (One case resulted from this source.)

In these ten instances there were thirty-four cases, including one death, all of which might have been prevented by thorough disinfection.

TABLE 4.—*Exhibiting the numbers of outbreaks and cases of and deaths from scarlet fever which occurred in the cities and rural districts of Michigan in 1903, and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in such localities. Compiled from reports of local health officials to the Secretary of the State Board of Health.*

Classes of political divisions.	Estimated population.	Health jurisdictions.	Outbreaks in:			Cases.*	Deaths.	Fatality. (Per cent cases of deaths.)	Rate per 100,000 population.	
			Localities.						Cases.	Deaths.
			No. of.	Per cent of all localities.						
State (83 counties).....	2,510,652	1,607	696	43	948	5,353	212	4.0	213.2	8.4
Cities.....	986,316	80	70	88	117	2,131	84	3.9	216.1	8.5
Villages and townships.....	1,524,336	1,527	626	41	831	3,222	128	4.0	211.4	8.4

\* Includes deaths.

TABLE 5.—*Exhibiting the reported number of outbreaks of scarlet fever which began and were present; the number of localities infected; the number of cases taken sick and which were present; and the number of deaths from scarlet fever, in Michigan, in each month during the year 1903.\**

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number of outbreaks began.....	118	74	66	55	66	53	41	54	60	65	64	107
Number of outbreaks present.....	239	255	210	184	193	157	131	137	150	160	178	230
Number of infected localities.....	237	251	208	181	192	152	130	134	148	157	175	227
Number of cases taken sick.....	711	522	394	382	434	332	261	212	308	383	413	648
Number of cases present.....	769	863	706	610	646	536	461	326	450	583	684	923
Number of deaths.....	33	17	21	14	27	10	14	15	8	10	18	23

\* The months in which scarlet fever was present were not stated in every instance.

*Immigrants possibly exposed to scarlet fever destined to settle in Michigan.*—During the year, notices were received from the Immigration officers at Canadian ports, that scarlet fever had occurred on board of two steamships prior to their arrival at such ports, the cases being landed at Dominion Quarantine, Grosse Isle. These notices gave the names and destinations of immigrants on board intending to settle in Michigan. Copies of these notices, including the lists of the names of the immigrants, were made on blanks, designed in this office for this purpose, and promptly sent from this office to the health officer of the jurisdictions where immigrants intended to settle.

The purpose of such action is to aid the local health officials in preventing outbreaks of dangerous communicable diseases, and, as a matter of fact, this method of forewarning the health officials of the localities where possibly infected immigrants are destined to settle has been productive of good results, and in recent years while these measures have been in use, very few outbreaks have been traced to immigrants.

No outbreaks of scarlet fever in 1903 could be traced to any of the immigrants mentioned in the official notices received at the office of the Secretary of this Board, but the health officer of Bessemer city reports the source of contagium of one fatal case of this disease in that city "Was taken sick aboard steamship vessel and released from quarantine before recovery."

An outbreak of scarlet fever at the village of Woodmere, in which seven cases occurred, was reported by the health officer as "Supposed to have contracted same among some emigrants on a Detroit-Chicago train."

*Estimated number of cases of scarlet fever prevented, and number of lives saved, by isolation and disinfection.*—Tables 6 and 7 and the accompanying diagram compare the average number of cases and deaths in outbreaks of scarlet fever where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where those measures were neglected.\* By Table 7 it may be seen that during the seventeen years, 1887-1903, there were more than four times as many cases and nearly five times as many deaths in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced.

By Table 6 it may be seen that during the year 1903 there were reported to the office of the State Board of Health 871 outbreaks of scarlet fever, with 3,722 cases, including 147 deaths.† Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed "Isolation and disinfection both neglected,"

\*In the compilation of the reports for Tables 6 and 7, and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate and disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and disinfection both neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officers' jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and disinfection enforced." If, however, he neglects to properly isolate and disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

†*Definition of outbreak.*—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over sixty days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended, unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area. Also, comparisons of years require that outbreaks be counted as closed, at the end of the year; while in comparing outbreaks for testing the value of isolation and disinfection it is necessary to take complete outbreaks, even where they extend from one year into the next. This explains any apparent discrepancy between the numbers of outbreaks, cases and deaths here given and the number given at the beginning of this article.

there would have occurred 5,888 cases, including 157 deaths, and taking from these respectively the cases (3,722), including deaths (147), which did occur, leaves 2,166 cases, including 10 deaths, indicated as prevented in these 871 outbreaks, by isolation and disinfection. By the same method for each year the indicated saving in the 9,875 outbreaks which occurred during the seventeen years, 1887-1903, is 50,643 cases, including 1,861 lives. This is shown in Table 7.

*Incubation period in scarlet fever.*—By Table 8 it may be seen that for eleven years, 1892-1902, the period of incubation in scarlet fever was reported in the greatest number of instances as seven days (278 instances), and the incubation period reported in the next greatest number of instances was ten days, in 196 instances. Seven days were also reported in the most instances in 1903. The total number of instances in which the period of incubation was reported in days was, for the eleven years, 1,623, and for the year 1903 it was reported in 224 instances. The average reported period of incubation for the eleven years was 9.0 days, and for the year 1903 it was 8.8 days.

*Ages of fatal and non-fatal cases of reported scarlet fever.*—Of the total number of cases, including deaths, reported to this office for the year 1903, the number of deaths per 100 cases was 4.0; and of the smaller number of cases, including deaths, of which the ages were stated, the number of deaths per 100 cases was 5.3. Of the 5,353 cases of scarlet fever reported, of which 212 were fatal cases, the ages were stated for 3,902 cases, of which 206 were fatal. There were only six fatal cases of which the ages were not stated, and there were 1,445 non-fatal cases of which the ages were not stated. This fact should be considered in studying the fatalities by age-groups and by single years of age in Table 9. By this table it may be seen that the fatality was greatest in children under two years of age, the fatality decreasing each succeeding year and periods of years up to twenty years of age. In children under five years of age the number of deaths per 100 cases was 10.5. This fatality was more than double that of any other five year age-group up to twenty years.

Table 10 shows that the greatest per cent of all cases, fatal and non-fatal, of scarlet fever occurred in children from five to nine years old, and the greatest per cent of all deaths was in children under five years of age, both for the year 1903 and for the eleven years, 1892-1902.

Table 11 shows that, by sex, the deaths were proportioned about the same, —the greatest per cent, both of males and females, having occurred in children under five years of age for the year 1903 and for the ten years, 1893-1902.

*Average age of fatal and non-fatal cases of reported scarlet fever.*—The average age of decedents for the year 1903 was 6.1 years for males and 7.6 years for females; for the period of years, 1893-1902, the average age of decedents was 5.3 years for males and 5.9 years for females. The average age of cases recovering from this disease for the year 1903 was 9.1 years for males and 10.1 years for females; for the period of years, 1893-1902, the average age was 8.1 years for males and 8.9 years for females.



TABLE 6.—SCARLET FEVER IN MICHIGAN IN 1903. Exhibiting the average numbers of cases and deaths per outbreak:—(1) in all the 871 outbreaks reported; (2) in the 288 outbreaks in which it is doubtful whether or not disinfection or isolation was enforced; (3) in the 39 outbreaks in which disinfection was enforced and isolation doubtful; (4) in the 95 outbreaks in which isolation was enforced and disinfection was doubtful; (5) in the 54 outbreaks in which disinfection was enforced and isolation doubtful; (6) in the 62 outbreaks in which isolation was enforced and disinfection neglected; (7) in the 119 outbreaks in which isolation and disinfection were both neglected; (8) in the 214 outbreaks in which isolation and disinfection were both enforced.

	(1) All outbreaks. (871 outbreaks)*		(2) Isolation or disinfection or both not mentioned, or statements doubtful. (288 outbreaks.)		(3) Disinfection enforced— isolation doubtful. (39 outbreaks.)		(4) Isolation enforced—disinfection doubtful. (95 outbreaks.)		(5) Disinfection enforced— isolation neglected. (54 outbreaks.)		(6) Isolation enforced—disinfection neglected. (62 outbreaks.)		(7) Isolation and disinfection both neglected. (119 outbreaks.)		(8) Isolation and disinfection both enforced. (214 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals†.....	3,722	147	1,262	53	202	7	335	15	287	14	153	8	7805	21	7688	29
Averages.....	4.27	.17	4.38	.18	5.18	.18	3.53	.16	5.31	.26	2.47	.13	65.76	1.76	35.12	1.14

\*These do not include all the cases and deaths in eleven of the principal cities, and in one township in which the disease was present in some part of the locality nearly all the time, but where the beginning and ending of an outbreak could not be determined.

†Includes deaths. ‡These figures are graphically represented in the diagram on this page, entitled "Isolation and disinfection restrict scarlet fever."

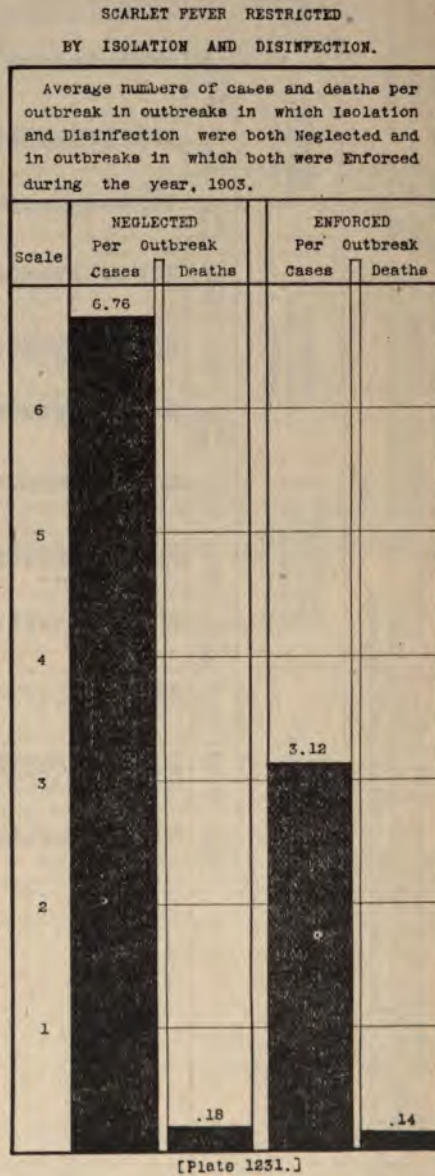


TABLE 7.—SCARLET FEVER. Exhibiting for each of the 17 years 1887-1903, the numbers of reported outbreaks, cases and deaths; also for this 17-year period the average numbers of cases and deaths per outbreak in all outbreaks; in those outbreaks in which isolation or disinfection or both were doubtful; isolation and disinfection both neglected; and, also, the numbers of cases and deaths indicated as having been prevented by isolation and disinfection.

Years.	All outbreaks.*			Isolation or disinfection, or both, not maintained, or statements doubtful.			Isolation and disinfection both neglected.			Isolation and disinfection both enforced.			Cases and deaths indicated as having been prevented by isolation and disinfection.		
	Outbreaks.	Cases.†	Deaths.	Outbreaks.	Cases.†	Deaths.	Outbreaks.	Cases.†	Deaths.	Outbreaks.	Cases.†	Deaths.	Cases.†	Deaths.	Deaths.
1887.....	299	1,882	141	190	1,200	93	32	440	34	64	148	11	2,220	177	177
1888.....	340	1,858	112	225	1,055	74	31	724	33	36	80	3	2,198	172	172
1889.....	417	2,822	123	284	1,453	61	72	1,208	48	52	140	10	2,175	156	156
1890.....	477	3,094	115	302	1,711	67	94	1,137	36	42	76	1	2,718	66	66
1891.....	602	4,956	193	380	3,012	91	141	1,704	66	42	107	1	2,342	90	90
1892.....	622	5,240	306	377	2,944	188	110	1,621	99	69	42	7	3,928	80	80
1893.....	667	5,219	327	387	3,197	204	124	1,511	99	60	157	8	2,912	207	207
1894.....	662	4,349	175	378	2,366	93	104	1,348	42	74	187	9	4,251	99	99
1895.....	655	2,905	85	275	1,269	42	82	1,138	27	92	162	4	4,798	36	36
1896.....	389	1,534	42	148	485	15	80	681	16	78	153	4	1,770	39	39
1897.....	336	1,531	52	130	654	21	63	427	17	59	127	5	1,747	101	101
1898.....	397	1,759	74	140	645	24	52	441	23	88	202	6	1,908	206	206
1899.....	611	3,531	148	202	1,315	52	108	1,251	63	133	335	7	3,544	142	142
1900.....	783	4,389	218	309	1,762	93	138	1,439	63	165	417	26	3,778	226	226
1901.....	917	4,771	177	327	1,709	51	162	1,546	71	228	565	21	3,977	103	103
1902.....	930	4,204	148	255	1,126	54	170	1,408	46	261	679	12	3,496	10	10
1903.....	871	3,722	147	288	1,262	53	119	1,805	21	214	668	29	2,150	10	10
Totals.....	9,875	57,686	2,583	4,594	27,052	1,276	1,712	18,829	764	1,730	4,290	164	80,598	1,849	1,849
Averages, 17 years.....	581	3,392	152	270	1,591	75	101	1,108	45	101	252	10	840,643	1,861	1,861
Average cases and deaths per outbreak for seventeen years, 1887-1903.....		5.84	.26		5.89	.28		10.97	.45		2.50		2,976	109	109

\* Outbreaks in twelve localities, where the disease was present throughout the whole year, are not included, owing to the difficulty in determining the beginning and ending of an outbreak in those localities. The localities which are thus excluded in 1903 are given in a foot-note to Table 6 of this article; and for previous years, in foot-notes to similar tables in articles on scarlet fever for those years.

† Includes deaths.

‡ The numbers of cases and deaths in this double column are found by multiplying "all outbreaks" for each year by the average numbers of cases or deaths per outbreak, in those outbreaks in which isolation and disinfection were both neglected, for that year, and deducting from the results thus obtained, the cases or deaths, as the case may be, which were reported to have occurred that year. § The two sets of numbers appearing in this column are based on two distinct methods of solution which are explained as follows:—(1) The 50,598 cases and 1,849 deaths are totals of the columns representing cases and deaths saved as explained in the † foot-note. (2) The 40,643 cases and 1,861 deaths are obtained by multiplying the average numbers of cases and deaths per outbreak for the seventeen years, 1887-1903 (10.97 and .45 where isolation and disinfection were neglected) by the total number of outbreaks, to find the numbers which would have occurred if all outbreaks had been neglected, and subtracting therefrom the numbers of cases and deaths that were reported as having occurred during the seventeen-year period.

TABLE 8.—*Exhibiting for the 11 years, 1892-1902, and for the year 1903, the reported period of incubation, in days, in cases of scarlet fever in Michigan. Compiled from reports of health officers in Michigan.*

Incubation period—days.....	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Instances in each day, for eleven years, 1892-1902*.....	18	66	85	115	120	98	278	123	108	196	30	52	16	171	20	14	8
Instances in each day, for the year, 1903*.....	1	6	15	13	15	19	37	22	21	20	7	2	1	29	1	1	....
Incubation period—days.....	18	20	21	22	23	24	25	26	27	28	29	30	33	35	36	42	56
Instances in each day, for eleven years, 1892-1902*.....	11	9	53	1	1	2	2	4	....	6	2	4	2	2	1	4	1
Instances in each day, for the year 1903*.....	....	3	7	....	....	....	....	....	....	1	1	....	1	....	....	....	....

\* In many of these instances it was reported as *about* the number of days stated.TABLE 9.—*Exhibiting in certain age-groups, the numbers of cases and deaths from scarlet fever; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; and the per cent that the deaths in each group were of the cases in that group. Compiled from all reports for the year 1903, which stated the ages.*

Ages in groups of years.....	Number and per cent of cases and deaths in certain age-groups.																	
	All ages known.	0-1.	1-2.	2-3.	3-4.	4-5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-54.	55-59.	Over 60.
No. of cases*.....	3,902	53	106	179	240	314	892	1,491	856	362	151	55	46	18	19	5	6	1
Per cent the cases in each group were of all cases.....	100	1.4	2.7	4.6	6.2	8.0	22.8	38.2	21.9	9.3	3.9	1.4	1.2	.5	.5	.1	.2	.03
No. of deaths†.....	206	8	16	24	25	21	94	74	16	5	9	2	4	1	....	1	....	....
Per cent the deaths in each group were of cases in that group.....	5.3	15.0	15.1	13.4	10.4	6.7	10.5	5.0	1.9	1.4	6.0	3.6	8.7	5.6	0	20.0	....	....
Per cent the deaths in each group were of all deaths.....	100	3.9	7.8	11.7	12.1	10.2	45.6	35.9	7.8	2.4	4.4	1.0	1.9	.5	....	.5	....	....
Per cent the deaths in special groups were of all deaths.....	....	45.6					81.5		7.8	9.7			1					

\* Does not include cases where the age was not stated.

† Does not include deaths where the age was not stated.



TABLE 10.—*Exhibiting in certain age-groups, the numbers of cases and deaths from scarlet fever in the year 1903, and in the 11 years, 1892-1902; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths. Compiled from all reports for the years 1892-1903, which stated the ages.*

Year.		Total No. included.*	Per cent of cases and deaths in certain age-groups.										
			All ages.	0 to 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 years and over.
1903.	Cases.....	3,902	100	22.8	38.2	21.9	9.3	3.9	1.4	1.2	.5	.5	.3
	Deaths.....	206	100	45.6	35.9	7.8	2.4	4.4	1.0	1.9	.5	0	.5
1892-1902.	Cases.....	33,864	100	28.6	41.3	18.9	5.9	2.2	1.3	.8	.5	.3	.2
	Deaths.....	1,605	100	56.4	29.7	7.7	2.6	1.7	.3	.9	.4	.2	.06

\* In this table cases include both fatal and non-fatal cases.

TABLE 11.—*Exhibiting, by sex, and in certain age-groups, the per cent of persons who died from scarlet fever in Michigan, during the year 1903, and the 10 years, 1893-1902; also the average age at death, and the number of deaths included. Compiled from such reports as stated the ages.*

Deaths from scarlet fever.															
Year.	Sex.	Average age, years.	No. of deaths included.	Ages.—In period of years. Per cent of deaths in each period of age.											
				All ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1903.	Males.....	6.1	94	100	46.8	39.4	6.4	1.1	3.2	1.1	2.1	0	0	0	0
	Females.....	7.6	112	100	44.6	33.0	8.9	3.6	5.4	.9	1.8	.9	0	.9	0
1893-1902.	Males.....	5.3	723	100	57.1	31.4	5.7	3.2	.8	.4	1.0	.3	0	0	.1
	Females.....	5.9	754	100	52.7	30.5	9.5	2.8	2.7	.4	.7	.5	.3	0	0

*Duration and average duration of sickness from reported scarlet fever.*—The duration of sickness of fatal cases in 1903 was given in seventy-eight instances among males and in seventy-nine instances among females. Of these, the greatest per cent died before the sixth day of sickness. The average duration of sickness in these fatal cases for the year 1903 was 11.7 days for males and 10.9 for females. For the ten years, 1893-1902, the average duration of fatal cases was 11.2 days for males and 11.3 days for females.

The average duration of non-fatal cases of scarlet fever for the year 1903 was 22.7 days for males and 21.9 days for females. For the ten years, 1893-1902, the average duration of sickness for non-fatal cases was 20.0 days for males and 20.9 days for females.

TABLE 12.—*Exhibiting, by sex, the per cent of persons in certain age-groups who recovered from scarlet fever, in Michigan, during the year 1903, and the 10 years, 1893-1902; also the average age and the number of cases included. Compiled from such reports as stated the ages.*

Year.	Sex.	Average age of non-fatal cases, years.	Number of cases included.	Age.—In periods of years. Per cent of non-fatal cases in each period of age.											
				All ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1903.	Males.....	9.1	1,726	100	24.5	38.6	20.9	9.5	3.4	1.2	.9	.3	.5	.06	.2
	Females.....	10.1	1,970	100	19.0	38.1	24.4	9.8	4.3	1.7	1.3	.6	.6	.2	.2
1893-1902.	Males.....	8.1	13,219	100	26.9	43.4	19.5	5.6	2.0	1.0	.7	.5	.2	.1	.05
	Females.....	8.9	15,465	100	22.8	42.5	21.6	6.5	2.7	1.6	1.0	.7	.4	.09	.1

TABLE 13.—*Exhibiting, by sex of patient, by per cent of cases which died in specified periods of time, the duration (in days) of fatal cases of sickness from scarlet fever in Michigan, during the year 1903, and the 10 years, 1893-1902. Compiled from those reports which stated the length of time the patient was sick.*

## Fatal cases of scarlet fever.

Year.	Sex.	No. of fatal cases included.	Average duration.	Duration of sickness:—Per cent of deaths in each period of days.											
				All periods.	0 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 days and over.
1903.	Males.....	78	11.7	100	37.2	21.8	15.4	5.1	14.1	0	0	1.3	0	3.8	1.3
	Females.....	79	10.9	100	32.9	26.6	17.7	7.6	5.1	6.3	2.5	0	0	0	1.3
1893-1902.	Males.....	489	11.2	100	37.6	25.6	12.7	7.8	6.3	4.3	2.5	1.2	.6	.2	1.2
	Females.....	525	11.3	100	38.3	23.8	13.7	9.1	6.5	1.9	2.9	.6	1.1	1.1	1.0

TABLE 14.—*Exhibiting, by sex of patient, by per cent of cases which recovered in specified periods of time, the duration (in days) of non-fatal cases of sickness from scarlet fever in Michigan, during the year 1903, and the 10 years, 1893-1902. Compiled from those reports which stated the length of time the patient was sick.*

Non-fatal cases of scarlet fever.														
Year.	Sex.	Number of cases included.	Average duration.	Duration of sickness:—Per cent of non-fatal cases in each period of days.										
				All periods.	0 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	Over 50 days.
1903.	Males.....	1,492	22.7	100	1.8	8.6	14.7	19.2	23.1	13.8	7.4	4.3	4.0	1.5
	Females.....	1,635	21.9	100	2.0	8.8	18.0	18.6	22.2	12.4	8.3	3.1	3.6	1.3
1893-1902.	Males.....	9,729	20.0	100	3.1	14.1	18.6	16.8	16.9	13.7	7.0	4.1	2.5	1.7
	Females.....	11,144	20.9	100	2.7	14.2	19.0	16.6	18.2	13.0	7.0	4.0	2.6	1.3

#### RÖTHELN (GERMAN MEASLES) IN MICHIGAN IN 1903.

During the year ending December 31, 1903, there were reported to the office of the Secretary of the State Board of Health thirty-three outbreaks of rōtheln resulting in two hundred thirty-three cases, one of which terminated fatally. In one outbreak the number of cases was not stated.

This Board has placed rōtheln in the list of "diseases dangerous to the public health," and recommends that all cases be reported and action taken, to prevent its spread, because when scarlet fever first makes its appearance, it is sometimes difficult to determine whether it is rōtheln or scarlet fever, and if it is called rōtheln and not reported, a dangerous disease may spread. Therefore, and because what is alleged to be rōtheln sometimes causes deaths, this Board has voted that rōtheln should be considered a "disease dangerous to the public health," and as such, it should be reported, and the same precautions taken to prevent its spread as are taken to prevent the spread of scarlet fever.



### MEASLES IN MICHIGAN.—DURING THE YEAR ENDING DECEMBER 31, 1903.

There were reported by local health officers to the Secretary of the State Board of Health, in all 674 outbreaks of measles, in 520 local jurisdictions, as having occurred in Michigan during the year 1903; and in these outbreaks there were reported to have occurred 8,941 cases,\* including 140 deaths.

The office of the State Board of Health is making constant efforts to get local health officials, and the people generally, to take measures to prevent the spread of measles, and to make reports to the local health officers and they to the secretary of the State Board of Health, concerning that disease in the several localities; but it is probable that a large number of cases are not yet reported. From Detroit, for instance, eleven fatal cases only were reported. Another locality from which fatal cases only was reported is given below and on a subsequent page of this article.

#### MEASLES IN 1903, COMPARED WITH PREVIOUS YEARS.

Under the present law, all deaths are reported to the Secretary of State, therefore this comparison may well take account of the reports to that officer as well as to this office.

*According to reports made to the Secretary of the State Board of Health.*—Compared with 1902, Table 1 shows a decrease of 28 outbreaks, 3,037 cases,\* 22 deaths, and a decrease of 3.8 cases, and .02 of one death, per outbreak.

The fatality for the State in 1903, excluding Bay City and Detroit, from where only fatal cases were reported, was 1.3 deaths per 100 cases, an increase of .4 of one death per 100 cases from the fatality in 1902, excluding the localities in that year from which fatal cases only were reported.

Compared with the averages for the thirteen years, 1890-1902, there was an increase of 179 outbreaks and 12 deaths, but a decrease of 3,230 cases; also a decrease of 11.3 cases, and .05 of one death, per outbreak. The fatality apparent for 1903 increased .5 of one death per 100 cases.

*According to reports made to the Secretary of State.*—Table 2 is based upon returns of deaths made to the Secretary of State. For all years preceding 1898 the statistics of deaths were collected after the close of the year in which they occurred; for all years after 1897 the deaths were recorded before burial, and returns were made to the Secretary of State early in the following month. There is reason to believe that under the new law very nearly all deaths are included in the statistics, whereas before 1898 a considerable proportion was omitted. This fact should be held in mind in comparing the deaths reported for the year 1903 with those reported in years previous to 1898. The death-rate for the year 1903 (6.9) is that stated in the Bulletin of Vital Statistics. The rates computed for previous years have been made from the *final* compilation of deaths from measles made by the Department of Vital Statistics. The final compilation for 1903 has not been made, consequently this rate (6.9), may not be quite accurate, because where two diseases are mentioned as causing a death, as not infrequently occurs, not always the same one is used in the final compilation as in the Bulletin of Vital Statistics.

\*Throughout this article "cases" include both fatal and non-fatal cases.

TABLE 1.—*Exhibiting the numbers of outbreaks, cases and deaths from measles, the number of localities in which they occurred, the average numbers of cases and deaths per outbreak, and the per cent of cases which proved fatal, for the years 1902 and 1903, and the averages for the 13 years, 1890-1902; with the departures of the same for 1903, from 1902 and from the average of the same for the 13 years, 1890-1902.*

Year.	Reported outbreaks.	Reported localities.	Reported cases.	Av. No. of cases per outbreak.	Reported deaths.	Av. No. of deaths per outbreak.	Deaths per 100 cases.
1902.....	702	546	11,978	17.1	162	.23	1.4
1903.....	674	520	8,941	13.3	140	.21	1.6
Departure of 1903 from 1902	—28	—26	—3,037	—3.8	—22	— .02	+ .2
Average for 13 years, 1890-1902.....	495	422	12,171	24.6	128	.26	1.1
Departures of 1903 from the averages for 13 years, 1890-1902.....	+179	+98	—3,230	—11.3	+12	— .05	+ .5

TABLE 2.—*Exhibiting the reported number of deaths from measles per 100,000 persons living in Michigan in each of the 36 years, 1868-1903. Compiled from the Secretary of State's Vital Statistics of Michigan. Population for intercensal years estimated by average annual increase based on National and State Censuses.*

Year.		1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	
Deaths (per 100,000, etc.).....		8.66	12.88	4.72	5.45	14.12	18.56	3.37	9.50	8.10	4.13	1.03	10.49	7.63	15.21	
Year.		1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Deaths, etc..		8.68	14.54	7.91	2.04	6.75	14.56	20.62	5.08	10.94	10.51	3.29	5.76	3.75	1.93	5.22
Year.		1897.	1898.	1899.	1900.	1901.	1902.	1903.								
Deaths, etc..		8.2	5.6	7.8	14.1	3.0	9.3	6.9								

*Sickness-rates from reported measles.*—In comparing sickness-rates it should be borne in mind that many cases of sickness from measles are not reported, and that it is probable that the omissions are greater in some parts of the State than in others. In Detroit and Bay City only the fatal cases were reported. (If the ratio of deaths to cases was the same in Detroit as in other parts of the State, 1.3 deaths per 100 cases, the cases of measles in Detroit were 846.)

MEASLES IN MICHIGAN IN 1903.

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TABLE 3.—Numbers of cases and deaths reported from measles, and the cases and deaths per 100,000 persons living in each county in Michigan during the year 1903.

State and counties.	Estimated population of Michigan for 1903.*	Number of reported		Number per 100,000 population, of		Counties.	Estimated population of Michigan for 1903.*	Number of reported		Number per 100,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,510,652	8,941	140	†356.1	5.6	Keweenaw.....	3,421	1	0	29.2	0
						Lake.....	4,487	1	0	22.3	0
Alcona.....	5,826	0	0	0	0	Lapeer.....	27,024	8	0	29.6	0
Alger.....	8,103	4	2	49.4	24.7	Leelanau.....	11,045	12	2	108.6	18.1
Allegan.....	38,624	308	4	1,030.4	10.4	Lenawee.....	48,338	296	0	612.4	0
Alpena.....	18,521	45	0	243.0	0	Livingston.....	19,278	65	2	337.2	10.4
Antrim.....	18,632	18	2	96.6	10.7	Luce.....	3,298	1	1	30.3	30.3
Arenac.....	11,258	4	0	35.5	0	Mackinac.....	7,934	1	0	12.6	0
Baraga.....	4,365	0	0	0	0	Macomb.....	33,670	10	0	29.7	0
Barry.....	21,921	39	0	177.9	0	Manistee.....	28,723	28	0	97.5	0
Bay.....	62,912	121	25	†290.5	39.7	Marquette.....	42,850	6	0	14.0	0
Benzie.....	10,489	26	0	247.9	0	Mason.....	19,113	1	0	5.2	0
Berrien.....	50,926	493	6	968.1	11.8	Mecosta.....	20,675	331	1	1,601.0	4.8
Branch.....	28,609	15	1	52.4	3.5	Menominee.....	27,593	56	6	203.0	21.7
Calhoun.....	50,233	92	0	183.1	0	Midland.....	15,048	53	2	352.2	13.3
Cass.....	20,726	51	0	246.1	0	Missaukee.....	10,478	32	0	305.4	0
Charlevoix.....	15,099	17	0	112.6	0	Monroe.....	32,542	122	1	374.9	3.1
Cheboygan.....	16,413	20	0	121.9	0	Montcalm.....	32,053	188	5	586.5	15.6
Chippewa.....	24,338	0	0	0	0	Montmorency.....	3,630	7	0	192.8	0
Clare.....	8,549	1	0	11.7	0	Muskegon.....	36,932	519	10	1,405.3	27.1
Clinton.....	24,573	33	0	134.3	0	Newaygo.....	16,948	36	0	212.4	0
Crawford.....	3,057	133	2	4,350.7	65.4	Oakland.....	45,848	294	2	641.2	4.4
Delta.....	26,185	4	0	15.3	0	Oceana.....	17,665	268	2	151.7	11.3
Dickinson.....	19,463	90	1	462.4	5.1	Ogemaw.....	8,827	4	2	45.3	22.7
Eaton.....	31,195	79	0	253.2	0	Ontonagon.....	5,859	2	0	34.1	0
Emmet.....	18,700	304	3	1,625.7	16.0	Osceola.....	18,549	95	0	512.2	0
Genesee.....	42,428	287	3	676.4	7.1	Oseoda.....	1,300	0	0	0	0
Gladwin.....	7,392	1	0	13.5	0	Otsego.....	6,862	11	2	160.3	29.1
Gogebie.....	18,064	6	2	33.2	11.1	Ottawa.....	39,955	460	4	1,151.3	10.0
Grand Traverse.....	21,958	15	1	68.3	4.6	Presque Isle.....	10,270	0	0	0	0
Gratiot.....	30,444	56	1	183.9	3.3	Roscommon.....	1,850	1	0	54.1	0
Hillsdale.....	29,662	81	3	273.1	10.1	Saginaw.....	80,911	42	2	51.9	2.5
Houghton.....	76,998	504	4	654.6	5.2	Sanilac.....	35,607	6	0	16.9	0
Huron.....	35,113	61	1	173.7	2.8	Schoolcraft.....	8,267	37	0	447.6	0
Ingham.....	39,881	59	0	147.9	0	Shiawassee.....	34,370	143	1	416.1	2.9
Ionia.....	34,084	175	1	513.4	2.9	St. Clair.....	55,678	14	0	25.1	0
Iosco.....	9,201	5	0	54.3	0	St. Joseph.....	23,290	407	2	1,747.5	8.6
Iron.....	10,835	100	1	922.9	9.2	Tuscola.....	36,625	23	2	62.8	5.5
Isabella.....	23,453	53	0	226.0	0	Van Buren.....	34,375	202	1	587.6	2.9
Jackson.....	49,062	287	1	585.0	2.0	Washtenaw.....	49,885	290	6	581.3	12.0
Kalamazoo.....	45,435	227	0	499.6	0	Wayne.....	376,951	89	14	†115.8	3.7
Kalkaska.....	7,877	3	0	38.1	0	Wexford.....	18,240	17	1	93.2	5.5
Kent.....	133,596	855	5	640.0	3.7						

\* Population estimated by average annual increase (arithmetical method), based on the State Census of 1894 and the U. S. Census of 1900.

† This rate is computed exclusive of the population and cases in Bay City and Detroit, because only fatal cases were reported from these places,—fifteen fatal cases from Bay City, and eleven fatal cases from Detroit.

‡ The case-rates in Bay and Wayne counties are computed exclusive of the population and cases in Bay City and Detroit, in their respective counties, because only fatal cases were reported from these localities.



The sickness-rate from reported measles for the State, excluding Bay City and Detroit, where none but fatal cases were reported, was 356.1 cases per 100,000 population. By counties, the highest sickness-rate was in Crawford county,—4,350.7 cases per 100,000 population. The sickness-rate in Crawford was over twelve times the average rate for the State. The counties of St. Joseph, Emmet, Mecosta, Muskegon, Ottawa and Allegan had the next highest rates. The sickness-rate in Allegan county, the lowest of these rates, was nearly three times the average rate. The lowest sickness-rate, in counties from which sickness from measles was reported, was in Mason county, where the rate was 5.2 cases per 100,000 population. No sickness from this disease was reported from the counties of Alcona, Baraga, Chippewa, Oscoda, and Presque Isle.

*Death-rates from reported measles.*—The death-rate from reported measles for the State in 1903 was 5.6 deaths per 100,000 population. The highest death-rate by counties, was in Crawford county,—65.4 deaths per 100,000 population, over eleven times the average death-rate for the State. The lowest death-rate, in counties from which deaths from measles were reported, was in Jackson county,—2.0 deaths per 100,000 population.

*Fatality, or "case-mortality," by counties from reported measles.*—The fatality from reported measles in 1903, i. e., the proportion of reported cases which proved fatal, for the whole State, exclusive of Bay City and Detroit, where none but fatal cases were reported, was 1.3 deaths per 100 cases. By counties, exclusive of the counties in which these localities are situated, the maximum fatality (100 per cent) occurred in Luce county. The minimum fatality, in counties from which deaths from measles were reported, was in Jackson and Mecosta counties, each of which had a fatality of .3 of one death per 100 cases. There were thirty-six counties from which sickness from measles was reported from which there were no deaths from this disease.

TABLE 4.—*Exhibiting the reported numbers of outbreaks and cases of and deaths from measles, which occurred in the cities, and in the rural districts, of Michigan in 1903, and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in such localities. Compiled from reports of local health officers to the Secretary of the State Board of Health.*

Classes of political divisions.	Estimated population.*	Health jurisdictions.	Outbreaks in—			Cases.	Deaths.	Fatality. (Per cent deaths of cases.)	Rates per 100,000 population.	
			Localities.		No. of.				Cases.	Deaths.
			No. of	Per cent of all localities.						
State.....	2,510,652	1,607	520	32.4	674	8,941	140	†1.3	‡356.1	5.6
Cities.....	986,316	80	62	77.5	85	3,126	60	†1.1	‡476.7	6.1
Villages and townships.....	1,524,336	1,527	458	30	589	5,815	80	1.4	381.5	5.2

\* Population estimated by average annual increase (arithmetical method), based on the State Census of 1894 and the U. S. Census of 1900.

† This rate is computed exclusive of the population and cases in Bay City and Detroit, because only fatal cases were reported from these places,—fifteen fatal cases from Bay City and eleven fatal cases from Detroit.

‡ The case-rates in Bay and Wayne counties, are computed exclusive of the population and cases in Bay City and Detroit, in their respective counties, because only fatal cases were reported from these localities.

*Distribution of reported measles in cities, and in the rural districts.*—From the data in Table 4 it may be observed that 77.5 per cent of the cities, and

about 30 per cent of the villages and townships, were infected with measles in 1903. The highest case-rate (476.7 cases per 100,000 population) and death rate (6.1 deaths per 100,000 population) occurred in the cities. The greatest fatality, 1.4 deaths per 100 cases, occurred in the rural districts. Two localities are not included in computing these rates because only fatal cases were reported from these places. These localities are given in a footnote to Table 4.

TABLE 5.—*Exhibiting the reported number of outbreaks of measles which began, and which were present; the number of infected localities, the number of cases taken sick and present; and the number of deaths, in each month of the year, 1903, in the different local jurisdictions of Michigan.\**

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number of outbreaks began.....	89	63	66	84	74	62	35	20	14	21	22	38
Number of outbreaks present.....	130	156	170	201	198	173	124	59	42	44	50	78
Number of infected localities.....	135	149	169	199	194	167	121	58	41	43	49	78
Number of cases taken sick.....	1,023	1,182	1,355	1,014	1,101	650	329	130	62	141	197	377
Number of cases present.....	1,090	1,452	1,782	1,300	1,420	879	514	197	85	163	224	424
Deaths from measles.....	11	13	18	16	16	19	12	2	1	5	6	19

\* The months in which scarlet fever was present was not stated in every instance.

*Distribution of measles by months in 1903.*—The second line of figures in Table 5, representing the reported number of outbreaks present, is obtained by actual count of the number of outbreaks reported as existing in each month. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months.

In computing the number of cases present in each month, each case is counted present in each month in which, or part of which, it was reported to have existed. The number of localities infected in each month were computed in a like manner.

Table 5 shows that so far as indicated by the reports of cases which, however, are known to be incomplete, the greatest number of cases of sickness from measles occurred in March, and the greatest number of deaths from measles occurred in June and December. Table 16, on a subsequent page, indicates that according to the sickness statistics, the greatest prevalence of measles occurred in May.

*Source of the contagium of cases of measles.*—Of the 8,941 cases of measles reported to this office, as having occurred in Michigan in the year 1903, the local health officials reported relative to the source of contagium in ways which may be summarized as follows: Traced to former case, 2,709; from outside jurisdiction, 274; unknown, 254; not stated, 98; "sporadic," 2.

*Immigrants possibly exposed to measles, destined to settle in Michigan.*—During the year many notices were received from the Immigration Officers at Quebec, and other Canadian ports, stating that measles had occurred on board of steamships prior to their arrival at Canadian ports, and that the cases had been landed at Dominion Quarantine, Grosse Isle. Similar notices, though less in number, were received from the United States Commissioner of Immigrants, at Philadelphia, Pa. These notices gave the names and destinations of immigrants on board intending to settle in Michigan. Copies of these notices, including the lists of the names of the immigrants, were made on blanks, designed in this office for this purpose, and promptly sent from this office to the health officers of the jurisdictions where the immigrants intended to settle.

The purpose of such action is to aid the local health officials in preventing outbreaks of dangerous communicable diseases, and, as a matter of fact, this method of forewarning the health officials of the localities where possibly infected immigrants are destined to settle has been productive of good results, and in recent years while these measures have been in use, very few outbreaks have been traced to immigrants.

During the year 1903 outbreaks were reported from Muskegon, Iron Mountain, Manistique, Escanaba, Marquette and Glenwood, where possibly infected immigrants were reported destined to settle, which occurred at or near the date of their arrival, and where the contagium was not reported as traced to some other source. Outbreaks definitely traced by local health officers to immigrants occurred at Platte township, Benzie Co., Greenland township, Ontonagon Co., Elmira township, Otsego Co., and Negaunee city.

*Estimated number of outbreaks and cases of measles prevented and lives saved by isolation and disinfection.*—Tables 6 and 7 and the accompanying diagram compare the average numbers of cases and deaths in outbreaks of measles where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where these measures were neglected.\* By Table 7 it may be seen that during the fourteen years, 1890-1903, there were about fourteen times as many cases per outbreak in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced.

\* In the compilation of the reports for Tables 6 and 7 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and disinfection both neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and disinfection enforced." If, however, he neglects to properly isolate and disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed, "Isolation or disinfection or both not mentioned or statements doubtful."

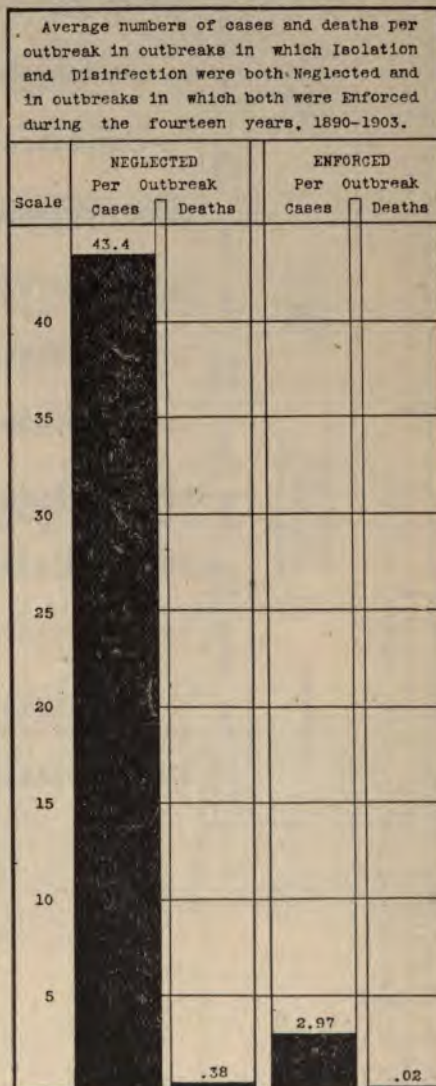


TABLE 6.—MEASLES IN MICHIGAN IN 1903. Exhibiting the average numbers of cases and deaths per outbreak:—(1) in all the 638 outbreaks reported; (2) in the 263 outbreaks in which it is doubtful whether or not disinfection or isolation was enforced; (3) in the 10 outbreaks in which disinfection was enforced and isolation doubtful; (4) in the 42 outbreaks in which isolation was enforced and disinfection was doubtful; (5) in the 38 outbreaks in which disinfection was enforced and isolation neglected; (6) in the 39 outbreaks in which isolation was enforced and disinfection neglected; (7) in the 146 outbreaks in which isolation and disinfection were both neglected; (8) in the 100 outbreaks in which isolation and disinfection were both enforced.

	(1) All outbreaks. (638 outbreaks.)*		(2) Isolation or disinfection or both not mentioned, or statements doubtful. (263 outbreaks.)		(3) Disinfection enforced— isolation doubtful. (10 outbreaks.)		(4) Isolation enforced— disinfection doubtful. (42 outbreaks.)		(5) Disinfection enforced— isolation neglected. (38 outbreaks.)		(6) Isolation enforced— disinfection neglected. (39 outbreaks.)		(7) Isolation and disinfection both neglected. (146 outbreaks.)		(8) Isolation and disinfection both enforced. (100 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals.....	8,523	117	3,674	60	67	2	317	5	416	5	96	1	3,684	40	269	4
Averages.....	13.36	.18	13.97	.23	6.7	.20	7.55	.12	10.95	.13	2.46	.26	25.23	.27	2.69	.4

\* A definition of the term "outbreak" and the facts relative to methods of compilation of outbreaks, are printed in foot-notes on preceding pages.

MEASLES RESTRICTED  
BY ISOLATION AND DISINFECTION.



[Plate 1235.]

TABLE 7.—*Exhibiting for the 14 years 1890-1903, the numbers of reported outbreaks, cases and deaths from measles; also for this 14-year period, the average number of cases and deaths per outbreak in all outbreaks, in those outbreaks in which isolation or disinfection or both were doubtful; isolation and disinfection both neglected; isolation and disinfection both enforced; and also the number of cases and deaths indicated as having been prevented by isolation and disinfection.*

Year.	All outbreaks.				Isolation or disinfection, or both, not mentioned, or statements doubtful.				Isolation and disinfection neglected.				Isolation and disinfection enforced.				Cases and deaths indicated as having been prevented by isolation and disinfection.*			
	Outbreaks.	Cases.	Deaths.		Outbreaks.	Cases.	Deaths.		Outbreaks.	Cases.	Deaths.		Outbreaks.	Cases.	Deaths.		Cases.	Deaths.		
1890.....	419	11,189	103		353	6,326	59		57	4,819	44		6	19	0		24,233	220		
1891.....	392	12,338	118		309	6,492	59		71	5,920	63		11	27	0		20,347	231		
1892.....	236	4,406	67		187	2,427	45		31	1,953	22		7	8	0		10,462	101		
1893.....	357	5,440	71		238	2,569	53		70	2,081	14		10	24	0		8,233	0		
1894.....	358	7,345	49		246	4,190	42		70	2,971	7		13	32	0		7,849	0		
1895.....	269	4,462	13		152	2,660	7		56	1,563	6		25	72	0		3,043	14		
1896.....	399	17,068	158		177	4,178	26		146	12,626	131		21	54	0		17,438	201		
1897.....	766	26,458	147		313	7,027	44		324	18,953	101		46	112	0		17,641	90		
1898.....	512	9,318	101		219	2,083	47		165	6,150	49		49	118	0		9,764	53		
1899.....	896	12,351	150		201	3,122	48		230	8,582	89		60	168	3		9,886	82		
1900.....	899	15,492	194		315	4,845	52		338	9,330	124		72	339	1		9,320	139		
1901.....	350	5,025	58		159	2,550	37		93	1,961	16		36	75	0		2,357	2		
1902.....	678	9,686	104		251	2,049	42		223	6,601	52		80	267	2		10,383	52		
1903.....	638	8,523	117		263	3,674	60		146	3,684	40		100	269	4		7,574	55		
Totals for the fourteen years, 1890-1903.....	6,869	149,101	1,450		3,389	54,792	621		2,020	87,494	758		536	1,581	12		158,530	1,440		
Annual averages for the 14 years, 1890-1903.....	491	10,650	104		242	3,914	44		144	6,250	54		38	113	.9		11,324	103		
Average cases and deaths per outbreak, 1890-1903.....		21.7	.21			16.2	.18			43.4	.38			2.97	.02					

\* The numbers of cases and deaths in this double column are found by multiplying "All outbreaks" for each year by the average number of cases, or deaths per outbreak, in those outbreaks in which isolation and disinfection were both neglected, for that year, and deducting from the results thus obtained, the cases or deaths, as the case may be, which were reported to have occurred that year, to learn the numbers that would have occurred if efforts for the restriction of the disease had not been made. The instances in which isolation and disinfection were enforced are still so few that the evidence is not yet very satisfactory. † The two sets of numbers appearing in this column are based on two distinct methods of solution and which are explained as follows: (1) the 158,530 cases, including 1,440 deaths, are totals of the columns representing cases and deaths saved as explained in the \* foot-note; (2) the 149,014 cases, including 1,160 deaths, are obtained by multiplying the average numbers of cases and deaths per outbreak for the fourteen years, 1890-1903; (43.4 and .38 where isolation and disinfection were neglected), by the total number of outbreaks to find the numbers which would have occurred if all outbreaks had been neglected, and subtracting therefrom the numbers of cases and deaths that were reported as having occurred during the fourteen-year period.

Graphic representation of interesting facts stated in the last line of figures in Table 7, may be seen in the diagram immediately preceding the table.

By Table 6 it may be seen that during the year 1903 there were reported to the office of the State Board of Health 638 outbreaks of measles with 8,523 cases, including 117 deaths.\* Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed, "Isolation and disinfection both neglected," there would have occurred 16,097 cases, including 172 deaths, and taking from these respectively the cases (8,523), including deaths (117) which did occur, leaves 7,574 cases including 55 deaths, indicated as prevented in these 638 outbreaks, by isolation and disinfection. By the same method for each year the indicated saving in the 6,869 outbreaks which occurred during the fourteen years, 1890-1903, is 149,014 cases, including 1,160 lives. This is shown in Table 7.

TABLE 8.—*Exhibiting for the 10 years, 1893-1902, and for the year 1903, the reported period of incubation in days, in cases of measles in Michigan. Compiled from the reports of health officers in Michigan.*

Incubation period—days.....	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Instances in each day, for ten years, 1893-1902†.....	1	5	7	11	25	24	167	70	181	261	47	89	18	341	26	16	2
Instances in each day for the year, 1903†.....	0	1	1	2	1	1	17	11	26	43	7	14	3	41	3	3	3
Incubation period—days.....	18	19	20	21	22	23	24	25	26	27	28	29	30				
Instances in each day, for ten years, 1893-1902†.....	12	1	18	31	2	2	1	0	1	0	0	0	1				
Instances in each day for the year, 1903†.....	0	0	1	7	0	0	0	0	0	0	0	0	0				

\**Definition of outbreak.*—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction in which instance they are considered as constituting a separate outbreak. When a period of over sixty days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended, unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area. Also, comparisons of years require that outbreaks be counted as closed, at the end of the year; while in comparing outbreaks for testing the value of isolation and disinfection it is necessary to take complete outbreaks, even where they extend from one year into the next. This explains any apparent discrepancy between the numbers of outbreaks, cases and deaths here given and the numbers given at the beginning of this article.

† In many of these instances it was reported as about the number of days stated.



TABLE 9.—*Exhibiting in certain age-groups, the number of cases and the number of deaths from measles; the per cent that the cases in each group were of all cases of known ages, the per cent that the deaths in each group were of all deaths at known ages; and the per cent that the deaths in each group were of the cases in that group. Compiled from all reports for the year 1903, which stated the ages*

	Number and per cent of cases and deaths in certain age-groups.																		
Ages in groups of years.	All ages known.	Under 1.	1.	2.	3.	4.	Under 5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-54.	55-59.	60 and over.
No. of cases*.....	4,493	115	207	231	213	262	1,028	1,440	838	464	304	166	109	65	48	13	9	2	7
Per cent the cases in each group were of all cases of known ages.....	100	2.6	4.6	5.1	4.7	5.8	22.9	32.1	18.7	10.3	6.8	3.7	2.4	1.4	1.1	.3	.2	.04	.2
No. of deaths*.....	131	28	35	18	6	7	94	17	5	6	1	3	0	2	1	0	0	0	2
Per cent the deaths in each group were of cases in that group.....	2.9	24.3	16.9	7.8	2.8	2.7	9.1	1.2	.6	1.3	.3	1.8	0	3.1	2.1	0	0	0	28.5
Per cent the deaths in each group were of all deaths at known ages.....	100	21.4	26.7	13.7	4.6	5.3	71.8	13.0	3.8	4.6	.8	2.3	0	1.5	.8	0	0	0	1.
Per cent the deaths in special groups were of all deaths at known ages.....		71.8					84.7			9.2		2.3		2.3		0		1.5	

\* Does not include those cases or deaths where the age was not stated.

*Incubation period in measles.*—By Table 8 it may be seen that for ten years, 1893-1902, the period of incubation in measles was reported in the greatest number of instances as fourteen days (341 instances), and the incubation period reported in the next greatest number of instances was ten days, in 261 instances. Ten days were reported in the most instances in 1903. The total number of instances in which the period of incubation was reported in days was, for the ten years, 1,360, and for the year 1903 it was reported in 185 instances. The average reported period of incubation for the ten years was 11.0 days, and for the year 1903 it was 11.1 days.

*Ages of fatal and non-fatal cases of reported measles.*—The reports of local health officials in Michigan, for the year 1903, stated the ages of 4,493 persons who were sick with measles, including the ages of 131 persons who died of that disease.

There are two erroneous and very harmful beliefs, quite prevalent among parents,—that measles cannot ultimately be escaped any more than teething, and that the least dangerous time for persons to have the disease is while quite young children. Whatever ground there may be for these beliefs elsewhere, reports to this office, as may be seen in tabulated form in Tables 9, 10, 11, 12 and 13, of this article, show that none exists in Michigan; but that, on the contrary, facts here bear evidence that measles is a preventable dis-

ease; and that it is *more* fatal to very young children than to persons in youth and middle age.

Table 9 shows that for the year 1903, 72 per cent of all deaths from this disease was in children under five years of age. Table 10 shows that for a period of eleven years, 1892-1902, 62 per cent of all deaths from measles was in children under five years old. Table 12 shows that by sex the distribution of deaths was about equal, 62.5 per cent of males and 63.0 per cent of females who died from measles, during the period of years, 1893-1902, were under five years old.

*Average age of cases of reported measles.*—The average age of decedents from measles in 1903 was 4.4 years for males and 6.4 years for females. For the period of years, 1893-1902, the average age of decedents was 7.0 years for males and 8.9 for females.

The average age of those who recovered from measles in 1903 was 11.1 years for males and 11.6 years for females. For the ten year period, the average age was 9.7 years for males and 9.5 years for females.

TABLE 10.—*Exhibiting in certain age-groups, the number of cases and the number of deaths from measles in the year 1903, and for the 11 years, 1892-1902; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths. Compiled from all reports which stated the ages.*

Year.		Total No. included.	Per cent of cases and deaths in certain age-groups.													
			All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 years and over.
1903.	Cases.....	4,493	100	22.9	32.1	18.7	10.3	6.8	3.7	2.4	1.4	1.1	.3	.2	.04	.2
	Deaths.....	131	100	71.8	13.0	3.8	4.6	.8	2.3	0	1.5	.8	0	0	0	1.5
1892-1902.	Cases.....	50,124	100	24.5	40.0	16.2	8.4	4.6	2.3	1.7	1.2	.6	.3	.1	.07	.1
	Deaths.....	877	100	61.7	12.9	5.9	5.9	3.2	2.9	1.5	2.2	1.5	.7	.7	.5	.6

TABLE 11.—*Exhibiting, by sex, the per cent of persons in certain age-groups who recovered from measles, in Michigan, during the year 1903, and for the 10 years, 1893-1902; also the average age and the number of cases included. Compiled from such reports as stated the ages.*

Year.	Sex.	Number of cases included.	Average age of persons who recovered—years.	Age.—In periods of years. Per cent of non-fatal cases in each period.													
				All ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 years and over.
1903.	Males.....	2,223	11.1	100	21.9	33.2	17.9	11.1	8.1	3.4	1.7	1.3	.8	.3	.2	0	.1
	Females.....	2,139	11.6	100	20.9	32.1	20.4	9.9	5.7	4.1	3.3	1.5	1.3	.3	.2	.1	.1
1893-1902.	Males.....	24,345	9.7	100	24.0	41.1	15.8	8.1	5.0	2.3	1.5	1.0	.6	.2	.1	.05	.1
	Females.....	24,150	9.5	100	23.7	40.2	16.7	8.5	4.2	2.2	1.8	1.3	.7	.4	.2	.09	.1

*Case-mortality rates from reported measles at the different ages.*—For the reason explained previously in this article, the reports of deaths from measles since 1898, are probably accurate. This fact should be considered in reference to the case-mortality rates, or fatality, from measles, as shown in Table 13.

Great difficulty has been experienced in obtaining reports of cases of measles, and, while there has been much improvement each year in reports of this disease, a large number of the cases are not yet reported.

The total number of cases in which the ages were given, for the period of fourteen years, 1890-1903, was 59,927 cases, of which number 1,057 were fatal cases,—giving a fatality, or case-mortality rate, for this period of years, of persons at all ages, of 1.8 deaths per 100 cases of measles.

TABLE 12.—*Exhibiting, by sex, the per cent of persons in certain age-groups who died of measles during the year 1903, and the averages for the 10 years, 1893-1902.*

Year.	Sex.	Average age of decedents—years.	Number of deaths included.	Per cent of deaths in certain age-groups.										
				All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 years and over.
1903.	Males.....	4.4	50	100	78.0	12.0	0	4.0	2.0	2.0	0	0	2.0	0
	Females.....	6.4	81	100	67.9	13.6	6.2	4.9	0	2.5	0	2.5	0	2.5
1893-1902.	Males.....	7.0	416	100	62.5	13.7	5.5	7.0	4.1	2.2	.7	1.4	1.4	1.4
	Females.....	8.9	427	100	63.0	10.0	5.4	5.4	2.6	3.3	2.3	3.0	1.6	3.3

Table 13 shows that the fatality from this disease for fourteen years, 1890-1903, was greatest in children under one year of age; in children under five years of age the fatality was eight times the fatality in children from five to nine and from ten to fourteen years old, these periods having been the age-periods of lowest fatality. The fatality generally increased from these age-periods up to old age, being especially high after fifty-five years of age.

TABLE 13.—*In certain age-groups, the numbers of cases and deaths from measles in the 14 years, 1890-1903, and the per cent that the deaths in each group were of the cases in that group. Compiled from all the reports to the Secretary of the State Board of Health for the years 1890-1903, which stated the ages.*

	Under 1 year.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 to 64.	65 and over.
Cases—1890-1903.....	1,115	14,528	23,422	9,912	5,196	2,904	1,430	1,049	714	395	187	86	39	41	24
Deaths—1890-1903.....	220	658	139	59	64	32	28	15	22	15	8	5	4	3	5
Per cent.....	19.7	4.5	.6	.6	1.2	1.1	2.0	1.4	3.1	3.8	4.3	5.8	10.3	7.3	20.8



*Duration and average duration of sickness from reported measles.*—By Tables 14 and 15 it may be seen that the greatest per cent of decedents from measles died before the eleventh day of sickness, and also the greatest per cent of those who recovered were sick less than eleven days.

The average duration of sickness of fatal cases of measles for the year 1903 was 10.0 days for males and 11.8 days for females; for the eleven years, 1892-1902, the average duration of fatal cases was 9.5 days for males and 9.1 days for females. The average duration of sickness of non-fatal cases was 14.1 days for males and 14.0 days for females; for the eleven years, the average duration was 13.1 days for males and 13.2 days for females.

TABLE 14.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from measles, in Michigan, during the year 1903, and the averages for the 11 years, 1892-1902. Per cent of deaths arranged in five-day groups. Compiled from those reports which stated the length of time the patient was sick.*

Fatal cases of measles.												
Year.	Sex.	Number of deaths included.	Average duration.	Duration of sickness:—Per cent of deaths in each period of days.								
				All deaths.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 and over.
1903.	Males.....	28	10.0	100	35.7	32.1	14.3	7.1	3.6	0	3.6	3.6
	Females.....	40	11.8	100	20.0	52.5	15.0	2.5	2.5	2.5	0	5.0
1892-1902.	Males.....	209	9.5	100	32.1	37.3	12.0	11.0	3.3	3.3	0	1.0
	Females.....	247	9.1	100	38.1	34.4	14.6	5.7	2.8	1.6	.8	2.2

TABLE 15.—*Exhibiting, by sex of patient, by per cent of cases which recovered in specified periods of time, the duration (in days) of non-fatal cases of sickness from measles in Michigan, during the year 1903, and the averages for the 11 years, 1892-1902. Per cent of cases arranged in five-day groups. Compiled from those reports which stated the length of time the patient was sick.*

Non-fatal cases of measles.																
Year.	Sex.	No. of cases included.	Average duration.	Duration of sickness:—Per cent of cases in each period of days.												
				All periods.	1 to 5 days.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 days and over.
1903.	Males.....	2,023	14.1	100	4.7	30.5	38.7	12.4	6.5	3.0	1.7	.6	1.1	.5	.05	.3
	Females.....	1,933	14.0	100	5.8	32.2	37.2	12.2	5.5	2.2	1.4	.6	1.1	.5	.2	1.0
1892-1902.	Males.....	17,583	13.1	100	5.5	35.6	36.7	9.9	7.4	2.6	1.0	.6	.4	.1	.1	.2
	Females.....	17,469	13.2	100	5.2	34.6	37.7	10.1	7.6	2.8	.7	.6	.3	.2	.09	.1

*Proportion of measles in the different months of the year 1903.*—Table 16 exhibits evidence, from two sources, on the proportion of measles reported in each month of the year 1903, namely, the sickness-statistics and the contagious-disease statistics. The *first* line states the per cent of all weekly postal-card reports, made by physicians in active general practice, which reported the presence of measles under their observation.

The *second* line represents by months the number of outbreaks of measles reported to this office by health officers.

TABLE 16.—*Measles in Michigan during the year 1903, exhibiting, by months, the per cent of all weekly card-reports received which stated the presence of measles, and the number of outbreaks of measles reported by health officers.*

1903.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Per cent of weekly card reports stating presence of measles.....	9	11	14	13	13	21	14	10	4	.3	1	2	4
Outbreaks.....	588	89	63	66	84	74	62	35	20	14	21	22	38

The evidence of the sickness-statistics, summarized in the first line of this table (16) indicates that the maximum prevalence of measles in Michigan in 1903 occurred in May, and the minimum where sickness was reported present was in September. The second line of the table, which is based on the contagious-disease statistics, indicates that the maximum number of reported outbreaks began in January and the minimum in September. This evidence is only for a single year, and might, therefore, be exceptional. In Table 14, in the article on sickness-statistics on a preceding page of this annual report for 1904, is a statement of the average per cent of weekly card reports stating the presence of measles by months for the ten years, 1893-1902, from which it appears that the maximum occurs in May, and the minimum in October.

#### SMALLPOX (VARIOLA) IN MICHIGAN IN 1903.

During the year ending December 31, 1903, there were reported to the Secretary of the State Board of Health, 710 outbreaks of smallpox in 520 localities in Michigan, which resulted in 6,341 cases, including thirty-three deaths.

*Definition of the term outbreak.*—An outbreak is considered as the existence of one case, or of many cases of smallpox at the same time or consecutively, within one health officer's jurisdiction, whether city, village or township. All cases of the given disease occurring within that jurisdiction and with only short intervals between them, are considered as part of the outbreak, unless the contagium can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate and distinct outbreak.

Whenever a break of sixty days or more has occurred in the progress of a communicable disease in a given township, village or city it has been regarded as two different outbreaks, but if the second appearance of the disease

could be traced from the first the intermission was disregarded and it was treated as a single outbreak. Comparisons of *years* require that outbreaks be counted as closed at the end of the *year*; while in comparing *outbreaks* for testing the value of isolation and disinfection it is necessary to consider *complete outbreaks*, even where they extend from one year into the next. This explains the discrepancies between the numbers of outbreaks, cases, and deaths, here given and the numbers given further on in this article in connection with Table 6.

*Smallpox epidemic.*—The mild but widespread epidemic of smallpox which has been prevalent in Michigan during the years 1901-3, is a part of the general widespread epidemic now prevalent in many sections of the United States. A marked characteristic of the disease existing in Michigan as in other States during these years, has been its extreme mildness. This particular feature of the disease has been so marked, that in many instances delay in combating it has resulted, very greatly increasing the difficulty of restricting the spread of the disease. An evidence of the mildness of the disease is shown by the very low fatality in the State. In the year 1903 only thirty-three deaths have been reported to have occurred out of a total of 6,341 cases of sickness, which gives the exceedingly low fatality of .52 of one death per 100 cases.

TABLE 1.—*Exhibiting the estimated population of Michigan in each of the years 1892-1903 inclusive, the numbers of outbreaks, cases, and deaths, from smallpox in each year, and the death-rate each year.\**

Year.	Population.	Cases	Deaths.	Death rate.*	Outbreaks.
1892.....	2,185,279	1	1	.004	1
1893.....	2,204,563	10	3	.01	2
1894.....	†2,241,454	285	60	.27	41
1895.....	2,278,579	185	47	.21	23
1896.....	2,315,517	38	16	.07	8
1897.....	2,352,455	15	0	.00	2
1898.....	2,389,393	32	1	.004	7
1899.....	2,426,331	139	6	.02	24
1900.....	†2,420,982	649	9	.04	100
1901.....	\$2,450,872	5,088	31	.13	620
1902.....	\$2,480,762	7,086	40	1.6	809
1903.....	\$2,510,652	6,341	33	1.3	710

\*Death-rates for the years 1892-1901 are computed per 10 000 inhabitants; for the years 1902 and 1903, per 100,000 inhabitants.

†State Census.

‡U. S. Census

\$Population estimated by average annual increase (arithmetical method) based on State Census of 1894 and the U. S. Census of 1900. Computed in the office of the State Board of Health.

It is well known that smallpox can be prevented or modified by vaccination; and a widespread epidemic of the disease can be attributed only to an equally widespread ignorance or wilfulness concerning smallpox and its prevention by vaccination and revaccination.

To do away with the widespread ignorance which is still so apparent, whenever information that smallpox is present in any locality in Michigan is re-



ceived by the Secretary of the State Board of Health, a letter is sent to the health officer of that locality, urging him and his local board of health to meet promptly and publicly recommend and urge general vaccination and revaccination, and to offer free vaccination to all who are not able to pay for the same. Pamphlets, "Vaccination and Revaccination,—The Prevention of Smallpox," also are sent to the health officer with the request that he distribute them to the neighbors of the families where the disease is present.

An important factor in the spread of this disease is the prevailing ignorance of the characteristic symptoms and physical signs of smallpox, this resulting in a general failure to recognize the disease until a large number of cases have occurred. Unfortunately this ignorance has not been confined to the common people, but has been quite common among practicing physicians. Inasmuch as the form of smallpox now present in this State is so mild that many cases occur for which no physician is called, the characteristics of the disease should be learned by the people generally, so that smallpox may be recognized as soon as it appears. Near the close of this article some of the characteristics of smallpox are mentioned.

*Investigations of outbreaks of suspected smallpox.*—During the year 1903, George E. Ranney, M. D., State Inspector of Dangerous Communicable Diseases, has been called upon to investigate outbreaks of suspected smallpox, where there was a dispute or doubt as to the diagnosis of the disease, or where the disease was not being restricted, at the following localities:

The townships of Windsor, Elmer, Gladwin and Pavilion; the villages of Nashville, Decatur, Mendon, Vassar, Vermontville and Leslie; and the cities of Hillsdale and Manistee.

Smallpox was found in each of the twelve instances mentioned above.

In two instances the conditions being such as are specified in Sections 4477-4483 of the Compiled Laws of 1897, the expense was paid by the State; in the ten other instances the expense of the investigation was assumed by the locality asking for the investigation.

The reports of the State Inspector have enabled this office to avail itself of the details of the outbreaks visited, and has facilitated the work of combating the disease. This method, also, has proved an effective means of lessening the spread of the disease, by educating the people as to the necessity of prompt action, strict isolation of all infected persons and things, immediate and general vaccination, and after death or recovery of patients the thorough disinfection of all infected things.

*Distribution of smallpox by localities during 1903.*—The distribution of smallpox by localities is shown in Tables 2 and 3.

By Table 3 it may be seen that nearly three-fourths of the cities, and less than one-third of the rural health jurisdictions, were infected with smallpox; also, that while the case rate in the rural districts was higher, both the fatality and death-rate were much lower, than in the cities.

*Smallpox in each month of the year 1903.*—Table 4 is designed to show the seasonal prevalence of smallpox. Sometimes the beginning of an outbreak is reported, but the exact time of the close of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months.

## SMALLPOX IN MICHIGAN IN 1903.

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TABLE 2.—Numbers of cases of deaths reported from smallpox per 100,000 persons living in each county in Michigan during the year 1903. Compiled from reports of health officers, etc.

State and counties.	Estimated population of Michigan for 1903.*	Number of reported		Number per 100,000 population, of		Counties.	Estimated population of Michigan for 1903.*	Number of reported		Number per 100,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,510,652	6,341	33	252.6	1.3	Keweenaw.....	3,421	0	0	0	0
						Lake.....	4,487	0	0	0	0
Alcona.....	5,826	110	0	1,888.0	0	Lapeer.....	27,024	89	0	329.3	0
Alger.....	8,103	1	0	12.3	0	Leelanau.....	11,045	0	0	0	0
Allegan.....	38,624	101	0	261.5	0	Lenawee.....	48,338	40	0	82.8	0
Alpena.....	18,521	95	0	512.9	0	Livingston.....	19,278	5	0	25.9	0
Antrim.....	18,632	4	0	21.5	0	Luce.....	3,298	0	0	0	0
Arenac.....	11,258	117	0	1,039.3	0	Mackinac.....	7,934	12	1	151.2	12.6
Baraga.....	4,365	7	0	160.4	0	Macomb.....	33,670	240	1	712.8	3.0
Barry.....	21,921	137	0	625.0	0	Manistee.....	28,723	6	0	20.9	0
Bay.....	62,912	461	0	732.8	0	Marquette.....	42,850	28	1	65.3	2.3
Benzie.....	10,489	2	0	19.1	0	Mason.....	19,113	17	0	88.9	0
Berrien.....	50,926	183	0	359.3	0	Mecosta.....	20,675	21	0	101.6	0
Branch.....	28,609	11	1	38.4	3.5	Menominee.....	27,593	47	0	170.3	0
Calhoun.....	50,233	22	0	43.8	0	Midland.....	15,048	40	0	265.8	0
Cass.....	20,726	1	0	4.8	0	Missaukee.....	10,478	16	0	152.7	0
Charlevoix.....	15,099	31	0	205.3	0	Monroe.....	32,542	111	0	341.1	0
Cheboygan.....	16,413	28	0	170.6	0	Montcalm.....	32,053	54	0	168.5	0
Chippewa.....	24,338	48	1	197.2	4.1	Montmorency.....	3,630	19	0	523.4	0
Clare.....	8,549	1	0	11.7	0	Muskegon.....	36,932	33	0	89.4	0
Clinton.....	24,573	293	2	1,192.4	8.1	Newaygo.....	16,948	12	0	70.8	0
Crawford.....	3,057	17	0	556.1	0	Oakland.....	45,848	83	1	181.0	2.2
Delta.....	26,185	20	1	76.4	3.8	Ocean.....	17,665	1	0	5.7	0
Dickinson.....	19,463	1	0	5.1	0	Ogemaw.....	8,827	34	0	385.2	0
Eaton.....	31,195	29	0	92.0	0	Ontonagon.....	5,859	0	0	0	0
Emmet.....	18,700	37	0	197.9	0	Osceola.....	18,549	80	0	431.3	0
Genesee.....	42,428	64	0	150.8	0	Oscoda.....	1,300	6	0	461.5	0
Gladwin.....	7,392	22	0	297.6	0	Otsego.....	6,862	48	0	699.5	0
Gogebie.....	18,064	1	0	5.5	0	Ottawa.....	39,955	196	1	490.5	2.5
Grand Traverse...	21,958	22	0	100.2	0	Presque Isle.....	10,270	117	1	1,139.2	9.7
Gratiot.....	30,444	17	0	55.8	0	Roscommon.....	1,850	6	0	324.3	0
Hillsdale.....	29,662	43	1	145.0	3.4	Saginaw.....	80,911	105	0	129.8	0
Houghton.....	76,998	86	1	111.7	1.3	Sanilac.....	35,607	193	1	542.0	2.8
Huron.....	35,113	380	3	1,082.2	8.5	Schoolcraft.....	8,267	13	0	157.3	0
Ingham.....	39,881	36	0	90.3	0	Shiawassee.....	34,370	52	0	151.3	
Ionia.....	34,084	191	0	560.4	0	St. Clair.....	55,678	123	1	220.9	1.8
Iosco.....	9,201	163	0	1,771.5	0	St. Joseph.....	23,290	7	0	30.0	
Iron.....	10,835	1	0	9.2	0	Tuscola.....	36,625	203	0	554.3	
Isabella.....	23,453	7	0	29.8	0	Van Buren.....	34,375	96	0	279.2	0
Jackson.....	49,062	63	0	128.4	0	Washtenaw.....	49,885	32	0	64.1	0
Kalamazoo.....	45,435	7	0	15.4	0	Wayne.....	376,951	896	13	237.7	3.4
Kalkaska.....	7,877	40	0	507.8	0	Wexford.....	18,240	6	0	32.9	
Kent.....	133,596	354	2	265.0	1.5						

\* Population estimated by average annual increase (arithmetical method) based on State Census of 1894 and the U. S. Census of 1900. Computed in the office of the State Board of Health.

TABLE 3.—*Exhibiting the numbers of outbreaks and cases of and deaths from scarlet fever which occurred in the cities, and in the rural districts of Michigan in 1903, and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in such localities. Compiled from reports of local health officials to the Secretary of the State Board of Health.*

Classes of political divisions.	Estimated population.	Health jurisdictions.	Outbreaks in:			Cases.*	Deaths.	Fatality. (Per cent cases of deaths.)	Rate per 100,000 population.	
			Localities.		No. of.				Cases.	Deaths.
			No. of.	Per cent of all localities.						
State (83 counties).....	2,510,652	1,607	520	32.4	710	6,341	33	.5	252.6	1.3
Cities.....	986,316	80	59	73.8	99	1,829	19	1.0	185.4	1.9
Villages and townships.....	1,524,336	1,527	461	30.2	611	4,512	14	.3	296.0	.9

\* Includes deaths.

TABLE 4.—*Exhibiting the reported number of outbreaks of smallpox which began and were present; the number of cases taken sick and which were present; the number of deaths which occurred; and the number of localities infected, in each month of the year 1903, in the different local jurisdictions of Michigan.*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number of outbreaks began.....	129	83	57	57	63	45	32	24	25	19	33	51
Number of outbreaks present.....	242	254	219	185	176	159	110	83	73	67	69	103
Infected localities, number.....	229	244	211	177	171	155	107	82	70	65	68	101
Cases taken sick, number.....	1,063	939	820	498	566	400	232	180	153	157	206	363
Cases present, number.....	1,163	1,472	1,226	848	823	648	424	294	241	218	290	482
Number of deaths.....	8	6	5	3	2	4	2	2	0	1	0	0

TABLE 5 —*Reported sources of contagium of cases of smallpox, 1903.*

Contagium reported as from outside jurisdictions.....	2,683
From infected clothing, etc.....	34
Unknown, or reports not definite.....	3,061
Not stated.....	563
All cases.....	*6,341

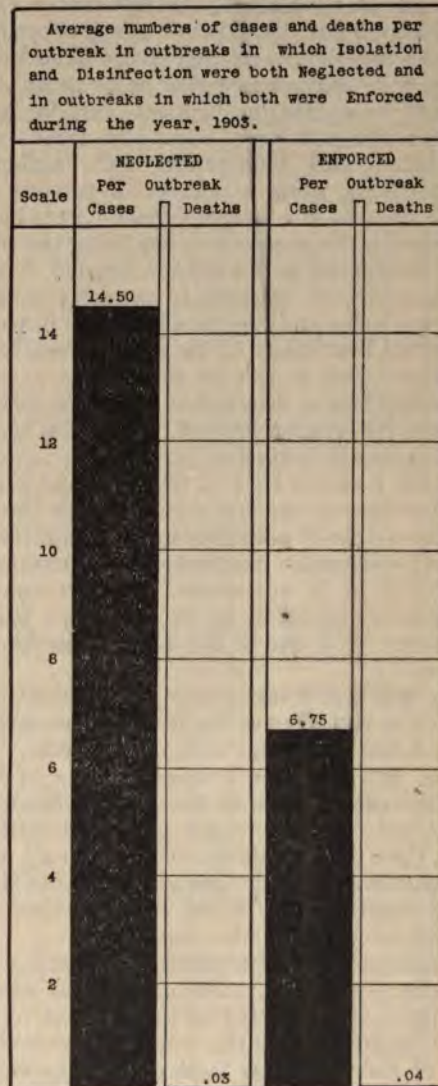
\* Of this number, 3,169 cases were reported as definitely traced to a former case.



TABLE 6.—SMALLPOX IN MICHIGAN IN 1903: Exhibiting the average numbers of cases and deaths per outbreak:—(1) in all the 636 outbreaks reported; (2) in the 131 outbreaks in which it is doubtful whether or not disinfection or isolation was enforced; (3) in the 141 outbreaks in which disinfection was enforced and isolation neglected or doubtful; (4) in 56 outbreaks in which isolation was enforced and disinfection was neglected or doubtful; (5) in the 69 outbreaks in which isolation and disinfection were both neglected; (6) in the 138 outbreaks in which isolation and disinfection were both enforced.

	(1) All outbreaks. (636 outbreaks.)		(2) Isolation or disinfection or both not mentioned or statements doubtful. (131 outbreaks.)		(3) Disinfection enforced— isolation neglected or doubtful. (141 outbreaks.)		(4) Isolation enforced—disinfection neglected or doubtful. (56 outbreaks.)		(5) Isolation and disinfection both neglected. (69 outbreaks.)		(6) Isolation and disinfection both enforced. (138 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals.....	5,130	14	1,505	5	1,375	2	317	0	1,001	2	932	5
Averages.....	8.07	.02	11.49	.04	9.75	.01	5.66	0	14.50	.03	6.75	.04

SMALLPOX RESTRICTED  
BY ISOLATION AND DISINFECTION.



[Plate 1234.]

*Estimated numbers of outbreaks and cases of smallpox prevented and lives saved by isolation and disinfection.*—Comparisons are made in Table 6, of the average numbers of cases, including deaths, in outbreaks of smallpox where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases, including deaths, in outbreaks where these measures were neglected.

In the compilation of the reports for Table 6 showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the columns headed, "Isolation and disinfection both neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed, "Isolation and disinfection enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed, "Isolation or disinfection or both not mentioned; or statements doubtful."

Table 6 shows that of 636 outbreaks, in 131 of them isolation and disinfection were either not mentioned or the statements were so doubtful as to be impossible of classification (a majority of them were probably neglected); in 141 outbreaks disinfection was enforced and isolation was neglected or doubtful; in 56 outbreaks, isolation was enforced, but disinfection was neglected or doubtful; in 69 outbreaks isolation and disinfection were both neglected, and out of the 636 outbreaks reported, 138 were reported as enforced.

By this Table (6) it may be seen that during the year 1903 there were reported to the office of the State Board of Health, 636\* outbreaks of smallpox, with 5,130 cases; including 14\* deaths. Had no efforts at restriction been made, and had the average number of cases and deaths per outbreak remained the same as in the column headed "Isolation and disinfection both neglected," there would have occurred 9,222 cases, including 19 deaths. Had the average number of cases in all outbreaks been the same as those in the columns headed "Isolation and disinfection both enforced," there would have occurred only 4,293 cases, instead of 5,130 cases, showing 837 cases, prevented by restrictive measures.

*Reported incubation period in smallpox.*—By Table 7 it may be seen that for the years 1895, 1896, 1900, 1901 and 1902 the period of incubation in smallpox was reported in the greatest number of instances as fourteen days (322 instances), and the incubation period reported in the next greatest number of instances was twelve days, in eighty-three instances; fourteen days were also reported in the most instances in 1903. For five years, 1895, 1896, 1900, 1901 and 1902, the period of incubation in days was reported in 815 instances, and for the single year 1903 it was reported in 288 instances.

\* Comparisons of years require that outbreaks be counted as closed at the end of the year, while in comparing outbreaks for testing the value of isolation and disinfection it is necessary to take complete outbreaks, even where they extend from one year into the next. This explains the discrepancies between the numbers of outbreaks, cases, and deaths, here given and the numbers given at the beginning of this article.

TABLE 7.—*Exhibiting for the five years, 1895, 1896, 1900, 1901 and 1902 and for the year 1903, the reported period of incubation in days, in cases of smallpox in Michigan. Compiled from reports of health officers in Michigan.*

Incubation period, days.....	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Instances in each day, for 1895, 1896, 1900, 1901, 1902	1	3	8	6	3	4	32	13	47	68	12	83	36	322	84	33	10	22
Instances in each day, for the year 1903.....	1	....	1	1	....	1	11	4	16	46	6	39	15	93	15	11	3	12
Incubation period, days.....	19	20	21	22	23	24	25	26	27	28	29	30	34	60	....	....	....	....
Instances in each day, for 1895, 1896, 1900, 1901, 1902	10	15	30	4	5	1	1	2	1	3	2	2	1	1	....	....	....	....
Instances in each day, for the year 1903.....	2	3	7	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....

TABLE 8.—*Exhibiting in certain age-groups, the number of cases and the number of deaths from smallpox; the per cent that the cases in each group were of all cases of known ages; the per cent that the deaths in each group were of all deaths at known ages; and the per cent that the deaths in each group were of the cases in that group. Compiled from all reports for the year 1903, which stated the ages.*

Ages in groups of years.	Number and per cent of cases and deaths in certain age-groups.																		
	All ages known.	Under 1.	1.	2.	3.	4.	Under 5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-54.	55-59.	60 and over.
No. of cases*.....	3,988	49	82	82	81	92	386	546	516	555	602	381	282	204	172	135	83	51	75
Per cent the cases in each group were of all cases of known ages.....		1.2	2.1	2.1	2.0	2.3	9.7	13.7	12.9	13.9	15.0	9.6	7.1	5.1	4.3	3.4	2.1	1.3	1.9
No. of deaths*.....	32	13	2	1	....	....	16	....	1	....	1	5	4	3	....	....	....	....	2
Per cent the deaths in each group were of cases in that group	.8	26.5	2.4	1.2	....	....	4.1	....	.2	....	.2	1.3	1.4	1.5	....	....	....	....	2.7
Per cent the deaths in each group were of all deaths, at known ages.....		40.6	6.3	3.1	....	....	50.0	....	3.1	....	3.1	15.6	12.5	9.4	....	....	....	....	6.3
Per cent the deaths in special groups were of all deaths, known ages.....		50.0					50.0	43.7					6.3						

\* Does not include those cases or deaths where the age was not stated.



The average reported period of incubation for the five years, 1895, 1896, 1900, 1901 and 1902 was 13.5 days, and for the year 1903, it was 12.8 days.

*Ages of fatal and non-fatal cases of reported smallpox in 1903.*—Table 8 shows the proportion of sickness and deaths, and the fatality, from smallpox, by age-groups. Table 8 shows the proportion of non-fatal cases of sickness from smallpox, by age-groups.

*Average age.*—The ages of thirty-two fatal cases of smallpox were reported for 1903. The average age of these being 18.2 years for males and 16.4 years for females. The average age of non-fatal cases was 22.6 years for males and 20.0 years for females.

*Duration and average duration of sickness from reported smallpox.*—Table 10 shows the duration of sickness of non-fatal cases of smallpox in 1903. The average duration of non-fatal cases was 19.6 for males and 18.4 for females. The duration of sickness of decedents was reported in but 23 instances. Of these the average duration was 9.3 for males and 8.3 for females.

TABLE 9.—*Exhibiting by sex, the number of persons in certain age-groups, who recovered from smallpox, and the per cent of cases by age-groups, who recovered from smallpox in Michigan, in 1903, also the average age and the number of cases included. Compiled from such reports as stated the ages.*

Year.	Sex.	Average age of non-fatal cases, years.	Number of cases included.	Age.—In periods of years. Number of non-fatal cases in each period of age.										
				All ages.	Under 5 years:	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 years and over.
1903.	Males.....	22.6	2,256	.....	172	279	264	328	363	238	176	126	90	220
	Females.....	20.0	1,700	.....	198	267	251	227	238	138	102	75	82	122
	Per cent the non-fatal males in each age-group were of the total non-fatal males.....			100	7.6	12.4	11.7	14.5	16.1	10.5	7.8	5.6	4.0	9.8
	Per cent the non-fatal females in each age-group were of the total non-fatal females.....			100	11.6	15.7	14.8	13.4	14.0	8.1	6.0	4.4	4.8	7.2

TABLE 10.—*Exhibiting, by sex of patient, the duration (in days) of non-fatal cases of sickness from smallpox, in Michigan, during the year 1903. Per cent of cases arranged in five-day groups. Compiled from those reports which stated the length of time the patient was sick.*

\* Non-fatal cases of smallpox.

Year.	Sex.	Number of cases included.	Duration of sickness:—Per cent of cases in each period of days.													
			All periods.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 to 60.	61 to 65.
																66 and over.
1903.	Males.....	1,826	100	3.8	13.2	21.7	21.7	15.8	10.6	6.6	2.6	1.4	1.1	.7	.8	.....
	Females.....	1,409	100	3.5	14.0	23.6	22.8	15.4	9.1	5.3	2.7	1.4	1.1	.6	.2	.2

\* There were but twenty-three fatal cases concerning which the duration of the sickness was stated.

*The present low fatality of smallpox in Michigan.*—On March 25, 1903, Dr. D. P. McLachlan, of York, Mich., wrote the Editor of the Michigan Monthly Bulletin of Vital Statistics as follows:

"I notice in the Bulletin for February, at the bottom of page vi, the conclusion that the fatality from smallpox is less than 1 per cent.

"Now it occurs to me that right there would be a good place to draw a line between smallpox and varioloid, or smallpox as modified by vaccination.

"While admitting that those figures are in all probability absolutely correct, when smallpox and varioloid are grouped together as smallpox, I do not believe that anyone will claim that they are anywhere near correct for pure and unmodified smallpox, and they are certainly as far from correct when varioloid is considered.

"If it could be shown by statistics that the fatality from smallpox is what it really is, and that vaccination affords almost absolute immunity from death (as it in reality does), and in many cases absolute protection from varioloid, the profession would have less trouble in convincing the laity of the necessity of vaccination."

This communication was referred to the Secretary of the State Board of Health, who wrote as follows:

"From Dr. McLachlan's letter I infer that he must be laboring under the misapprehension that the smallpox now so prevalent in Michigan, and in most of the States of the Union, is the same variety of smallpox as that which occurred here many years ago. This is not the fact. In April, 1897, there came from Mexico to Toledo, Ohio, a person who had this mild variety of smallpox. It was then called 'impetigo.' But as it spread from Toledo into Michigan, the disease was investigated by the State Inspector of Communicable Diseases, and was declared by him to be smallpox. Since that time a similar type of disease has spread all over this country. It is the same type of smallpox that had prevailed in Mexico. In Michigan the fatality has been about one per cent, whereas in the variety of smallpox which formerly occurred in Michigan the fatality was about 20 per cent.

"Dr. McLachlan's request for separate statements of fatalities in the vaccinated and unvaccinated can be complied with in a general way by stating the facts,—that in this mild variety of smallpox the deaths are all of persons unvaccinated; and, as a rule, the cases are the same; the exceptions being that in a small proportion of the cases the persons had been vaccinated so long ago as to have lost the immunity which recent successful vaccination affords."

*Public Schools and Vaccination.*—On August 22, 1903, Dr. W. B. Hinsdale, Health Officer of Ann Arbor city, wrote this office as follows:

"May I ask your opinion and advice upon the following points?

"1. Can a Board of Education or a Board of Health or both enforce vaccination? That is, can they deny a scholar school privileges until he is vaccinated? The Board of Education in this city seem to hold they can not make vaccination compulsory.

"2. Would you advise making vaccination in the public schools here compulsory, if it can be done?

"You appreciate that this is an educational centre, the public schools, mostly the high school, having between 300 and 400 students from outside the city."

On August 24, 1903, the Secretary of this Board replied that there is no law for making vaccination compulsory, and recommended that, during an epidemic of smallpox, the Board of Education should require the vaccination of pupils.

By reason of numerous enquiries for information upon this subject, this Board has issued a special bulletin\*, a summary of which follows:

"1. The legislature has power to enact a constitutional law requiring compulsory vaccination; and therefore

"2. The legislature may enact a law authorizing or directing school boards to require vaccination of persons attending the public schools.

\*Teachers' Sanitary Bulletin, March, 1902.

"3. In the absence of legislative authorization, no school board can make and enforce a requirement of compulsory vaccination.

"4. Under its general powers, a school board cannot adopt a continuing rule which excludes unvaccinated persons from the privilege of attending school; but

"5. Under the general statutory powers of such boards, they have, during actual or threatened epidemics of smallpox within their districts or vicinity, power to withhold the privilege of attendance in the public schools, from persons who have not been vaccinated."

*Bogus substitute for vaccination.*—January 22, 1903, Dr. C. O. Probst, Secretary of the State Board of Health of Ohio, wrote this office as follows:

"A considerable number of physicians in this State, generally of the Homeopathic School, if not always, are using some 'internal remedy' in lieu of vaccination.

"I think some of them are using what they call 'Variolinum.' One man writes me that this 'internal remedy' was discovered by Dr. Uhlman, of Chester, Pa. Many people are seizing upon this substitute for vaccination, and I am fearful that this will spread rapidly if not combated. I am receiving letters asking whether this Board, or any other State Board, recognizes the use of any internal medicine as preventive of smallpox. I might say that some of the physicians who are using this remedy are not hesitating to give a certificate to the school authorities that they have successfully vaccinated such and such a person, and this is making us trouble.

"I should be glad to hear your opinion of this, with the privilege of publishing it in due time."

On January 23, 1903, the Secretary of this Board wrote to Dr. Probst as follows:

"Asidee from isolation and disinfection, the only measure this board recognizes and recommends as a preventive of smallpox is vaccination and revaccination; and the reports received at this office from health officers throughout the State prove conclusively that a recent successful vaccination is a sure preventive of this mild form of smallpox.

\* \* \* \* \*

"I fully agree with you that if the alleged 'Variolinum' as an internal remedy in lieu of vaccination be substituted for vaccination, smallpox will rapidly spread, because as before stated, the only known preventive of smallpox is that of vaccination and revaccination."

### CHICKEN-POX (VARICELLA) IN MICHIGAN IN 1903.

During the year ending December 31, 1903, there were reported to the office of the State Board of Health seventy-one outbreaks of chicken-pox in seventy-one localities in Michigan, which resulted in 341 cases (including four deaths) of chicken-pox.

By reason of the frequent diagnosis of smallpox as chicken-pox, upon the receipt at this office of a report of an outbreak of chicken-pox, a circular letter has been sent to the health officer of the jurisdiction, in which he was advised to require reports of this disease from householders and physicians; to regard as probable smallpox all cases of chicken-pox in persons over ten or twelve years of age and order the isolation of all school children said to be suffering from chicken-pox, until the disease had been proven not to be smallpox; to recommend the vaccination of all persons exposed to chicken-pox; and to use every reasonable precaution in outbreaks of chicken-pox, so that the public health interests might be given the benefit of every doubt. In this way it is believed many cases of smallpox have been prevented.



## TETANUS (LOCKJAW) IN MICHIGAN IN 1903.

During the year ending December 31, 1903, there were reported to the Secretary of the State Board of Health, fifty-two deaths from tetanus which occurred in Michigan during that year. Twenty-nine deaths were reported as resulting from the use of the toy pistol on the Fourth of July; four deaths were caused from a rusty nail; four from injury; three from a shotgun; two probably from the hands and soiled finger nails of midwife; one from a scald by boiling water, and in nine, the sources of contagium were not stated or were unknown.

Relative to the cases of lockjaw caused by the discharge of blank cartridges from toy pistols on the Fourth of July, 1903, the "Independent," a New York weekly, printed an article headed, "Again the Deadly Toy Pistol." This article stated that "There were ninety-eight fatal cases of lockjaw, due to apparently slight wounds received on the Fourth of July. This is, of course, an incomplete record. There were forty-one fatal cases in Pennsylvania alone, and it is probable that a full list for all the states would show not less than four hundred. Almost without exception those who suffered and died of this terrible disease were boys between the ages of five and fifteen years, and in more than nine-tenths of the cases reported the fatal wounds had been inflicted by toy pistols. These are cheaply made. The injury is due sometimes to an explosion of the toy, sometimes to a discharge that drives part of the blank cartridge or wadding into the hand. We described this annual epidemic of tetanus in the Independent of July 2, and gave such warning as we could to those who permit their children to use the deadly toy pistol. It has generally been held that the germs or bacilli of lockjaw are introduced into these Fourth of July wounds by the agency of soil or dirt which is on the hand when the wound is made or is attached to it afterwards. Because the disease is so closely associated, however, with wounds inflicted by the blank cartridges, used in toy pistols, the results of an investigation made a few weeks ago by Dr. Connolly, the bacteriologist of the Newark Board of Health, should not be overlooked. He reported to the Board July 2, that a careful bacteriological examination of two makes of these blank cartridges in his laboratory had disclosed the presence of large numbers of bacilli of tetanus, either in the wadding or in the fulminate. This annual slaughter of American boys should cease. In some states the sale of toy pistols to minors is forbidden by law. It should be prohibited everywhere. The police of all our cities should be required to enforce such laws rigidly, and to confiscate every toy pistol found in possession of a boy on the Fourth or at any other time. It seems to us that the Board of Health could do much for the protection of the boys. The killing of four hundred of them by lockjaw in July next ought to be prevented in some way."

July 24, 1903, the Secretary of this Board wrote to R. N. Connolly, M. D., Bacteriologist, City Board of Health, Newark, New Jersey, as follows:

"In the editorials of the 'Independent' (New York) of July 23, I observe that you are commented upon as having made a careful investigation of two makes of blank cartridges, and reported to your board of health on July 2, that your examination had disclosed the bacillus of tetanus either in the wadding or in the fulminate. If your report upon the examination is to be obtained, I should be pleased to be advised of the fact, and how to obtain a copy."

July 30, 1903, Dr. Connolly sent a copy of his report to the Board of Health of N. J., to the Secretary of this Board, which reads as follows:

"Your attention is respectfully invited to the fact that bacteriological examination of samples of two different makes of blank cartridges has been made at the Bacteriological Laboratory during the past week, with the result that among other germs present in the contents of the shells, the bacilli of tetanus were found in large numbers.

"The tetanus bacilli found are so typical in shape and the odor so characteristic that there is very little doubt of their identity.

"The samples examined were purchased in the open market and the cartridges selected promiscuously from the contents of the boxes.

"The frequency with which lockjaw follows accidental wounds received by the explosion of blank cartridges may possibly be explained by the presence of these germs in the materials used in the manufacture of the cartridges.

"Further examinations will be made to determine if the tetanus bacilli are constantly present, and also to find whether the germs are in the explosive or in the paper wads used."

Michigan Statutes provide a penalty of a fine or imprisonment for the sale, gift, or furnishing to, any child under the age of thirteen years, of any cartridge of any form or material, or any pistol, gun, or other mechanical contrivance, specially arranged or designated for the explosion of the same. Possession of such by a person under the age of thirteen years is unlawful. Sections 11530-11532, Compiled Laws of Michigan, 1897.

The *average age* of those who died from tetanus, in Michigan, in 1903, as the result of using toy pistols, was fourteen years, and nearly sixty per cent were thirteen years of age, and should not, under the law, have been allowed to have such instruments of death in their possession.

Tetanus is generally recognized as a dangerous communicable disease. It has been so declared by this State Board of Health. But the disease is not spread directly from person to person. It is caused by germs, of one particular species, a bacillus which has been repeatedly found present in cases of sickness from this disease, also in dirt, and in cartridges. The specific micro-organism which causes tetanus usually enters the body through a wound, scratch, or abraded surface of the body. Tetanus sometimes follows stepping upon a nail, especially in an old board about a barn or garden, and frequently follows an injury by a cartridge of a toy pistol, or other wound inflicted by means of gunpowder upon the hand, face, or foot. A wound, upon some part of the body, within ten days prior to the development of the disease, should be carefully inquired for, and the fact reported. The germs are sometimes found in garden soil, and about barns, and in gunpowder made from unpurified saltpetre, derived from the excrement of bats in caves. Perhaps this explains the frequency of tetanus following injuries by firecrackers and cartridges of toy pistols.

In those cases of death from tetanus, in Michigan, in 1903, reported to the State Board of Health, the *average period of incubation*, or the time elapsing between the injury and appearance of the symptoms of tetanus, was six days.

The *average duration* of the sickness, or the time elapsing between the first appearance of the symptoms and death, was about five days. In two instances death occurred the same day the symptoms first appeared.



## ACTINOMYCOSIS (LUMPY-JAW) IN MICHIGAN IN 1903.

During the year 1903, information relative to five outbreaks of actinomycosis (lumpy-jaw) in Michigan were received at this office. Four of these outbreaks occurred in cattle. One outbreak was reported as having occurred in animals.

Dr. Knight, health officer of Utica, telephoned this office, saying that animals were sick with lumpy-jaw in his jurisdiction, and that the meat was about being sold. Dr. Baker informed him that the facts should be reported to the State Live Stock Commission.

## PLEURO-PNEUMONIA AMONG CATTLE, IN MICHIGAN IN 1903.

Two reports of pleuro-pneumonia among cattle in 1903, were received at the office of the Secretary of this Board,—one of four cases in Riley township, Clinton county, and one of twenty-two cases, including several deaths, in Benona township, Oceana county.

The duty of the local boards of health of these jurisdictions, in making investigations and ordering the isolation of sick and exposed cattle, prior to the inspection by the State Live Stock Sanitary Commission, was outlined in letters from this office.

## GLANDERS (FARCY) IN HORSES IN MICHIGAN IN 1903.

During the year ending December 31, 1903, there was reported to this office, ten outbreaks of glanders in horses, in ten localities in Michigan. With the exception of one locality where the health officer stated that there were several cases of glanders in horses, only one case in each locality has been reported.

One of the most interesting of these outbreaks is described in the following letter from the health officer of Briley township, Montmorency county:

"A disease has appeared among the horses of this section. My own has had it and is now incapacitated for any use. The symptoms are a slight cough increasing in a few weeks to a prolonged dry, hollow cough, with increasing respiration, resembling heaves, the paroxysms intermittent. At times the horse would show no symptoms for several days then would suddenly be seized with an asthmatic attack, cough and heave and appear in great distress, unfit to drive, and scarcely able to stand. I could detect no fever of any account, appetite ravenous, bowels and urine apparently normal, a watery (slight) discharge from the nostrils, later mixed with a small quantity of a dirty looking pus, the membrane looking as though it had been scalded, peeling off in shreds. In the earlier stage he discharged a handful of thick mucous from one nostril, *once only*. Other horses discharge in water troughs chunks of an opaque mucous that sinks to the bottom.

"I have given my horse all the usual cough remedies, and more, but the relief is but temporary.

"The disease was brought here from Lewiston, as near as I can learn, from a sale stable where they keep horses brought in from Southern Michigan and Indiana.

"What is the disease and what should be done with it?

"Nearly every horse I meet has it in a more or less pronounced form."



In this case, as in the other cases reported to this office, the health officer of the jurisdiction was advised to report to the State Live Stock Sanitary Commission, and, pending their investigation, to enforce strict quarantine of the suspected animals.

### ITCH (SCABIES) IN MICHIGAN IN 1903.

During the year 1903, there were reported to this office three outbreaks of itch, or scabies, from three localities in Michigan. These outbreaks occurred in the schools of Leroy township, Osceola County; Saginaw city, Saginaw County, and Gladwin city, Gladwin County.

Scabies not having been declared by this Board to be a dangerous communicable disease, the correspondence relative to these outbreaks was designed to ascertain whether the cases might not have been smallpox in the present mild form. A sample of the correspondence follows:

December 15, 1903, the Secretary of this Board, wrote to Dr. C. G. Suylandt, health officer of Gladwin city:

"Your postal of December 12, stating \* \* \* \* \* that you have an abundance of scabies, is before me, for which please accept thanks.

"Relative to the scabies I trust that you will thoroughly investigate and be absolutely sure that the disease is not the mild form of smallpox which is yet quite prevalent in this State. Quite a large number of outbreaks have been allowed to spread because the disease was not at first recognized as smallpox, but was called almost everything except smallpox. \* \* \* I trust that I may hear from you relative to this eruptive disease and that you will fully describe all of the symptoms and signs of the disease."

December 15, 1903, Health Officer C. G. Suylandt replied as follows:

"Yours received of December 15, regarding the cases of scabies I mentioned. Don't you think for one moment that I cannot make a diagnosis in these cases, nor that I would not make strenuous efforts were there any doubtful symptoms. These are cases of scabies pure and simple, breaking out mostly under clothing in small pink papules, with a little water blister in top—itches most at night when retiring or when near a warm stove, no constitutional symptoms whatever—also comes in crops about once in twenty days, as the eggs hatch out.

"Treatment with sulphur iodide and baths do it up at once."

### ERYSIPELAS IN MICHIGAN IN 1903.

During the year 1903, reports relative to thirty-three cases of erysipelas were received at this office from eleven localities in Michigan. There were no fatal cases reported from this disease. Most cases were called facial erysipelas.

### MUMPS (PAROTITIS) IN MICHIGAN IN 1903.

During the year 1903, nine outbreaks of mumps, resulting in seventy-nine cases, including two deaths, were reported to this office. In one outbreak, the number of cases were not reported, so that the exact number of cases may *not be accurate*. Probably only two deaths were caused by the disease.

## RABIES (HYDROPHOBIA) IN MICHIGAN IN 1903.

During the year 1903, there were reported to this office, twenty-five outbreaks of rabies in animals, in twenty-three localities in Michigan, resulting in twenty-nine reported cases. In two of the outbreaks the numbers of cases were not stated, so that in all probability, the exact total number of cases was greater than twenty-nine.

Four of these outbreaks were caused by cattle; one by a cat; one by a pig; one by sheep and eighteen by dogs.

In the outbreaks caused by dogs, twelve persons were bitten resulting in the death of one of them. Seven of the persons bitten were sent to the Pasteur Institute at Ann Arbor for treatment.

Several herds of cattle and sheep and several hogs and dogs were bitten by rabid dogs which caused the death or the killing of nearly all of the animals.

## ALLEGED NUISANCES IN MICHIGAN IN 1903.

During the year 1903, communications relative to 128 alleged nuisances in Michigan were received at the office of the State Board of Health.

The causes to which the alleged nuisances mentioned in these communications were attributed, may be classified as follows:

Improper drainage and sewerage, 28; unsanitary conditions in or about houses, public buildings, barns, barnyards, stockyards, privies, pigpens and stables, 21; barnyards, stockyards, pigpens, manure piles and outhouses too near residences, 20; insufficiently buried carcasses of animals, 9; stagnant water, 7; killing or slaughtering of cattle and hogs in central portions of towns, 6; open sewers, ditches, and cesspools, 6; refuse from creameries and tanneries thrown into rivers, 6; unsanitary conditions of cities, villages, and townships, 5; odors from chemical works, cider mills, and sugar factories, 4; filthy slaughter-houses and meat markets, 3; diseased cattle kept with healthy cattle, 1; garbage fed to cattle, 1; hogpen too near well, 1; ice used for packing purposes inside of breakwater, 1; condition of culvert, 1; and seining fish in lake considered unsanitary, 1.





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the 1990s, the number of people in the world who are under 15 years of age is expected to increase by 1.5 billion, from 1.1 billion in 1990 to 2.6 billion in 2010. The number of people aged 65 and over is expected to increase by 1 billion, from 350 million in 1990 to 1.4 billion in 2010. The number of people aged 15-64 is expected to increase by 1.5 billion, from 2.5 billion in 1990 to 4.0 billion in 2010. The number of people aged 65 and over is expected to increase by 1 billion, from 350 million in 1990 to 1.4 billion in 2010. The number of people aged 15-64 is expected to increase by 1.5 billion, from 2.5 billion in 1990 to 4.0 billion in 2010.









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